Bound by
ABBEY BOOKBINDING & PRINTING
Unit 3 Gabalfa Workshops Excelsior Ind. Est. Cardiff CF14 3AY
Tel: (029) 2062 3290 Fax: (029) 2062 5420
Email: info@abbeybookbinding.co.uk
Web: www.abbeybookbinding.co.uk

The Alignment of Information Management and Technology to future Service and Business Strategies of the NHS in Wales

Michael John Lugg

A submission presented in partial fulfilment of the requirements of the University of South Wales for the Degree of Doctor of Business Administration.

Abstract

Introduction

Strategic alignment of information technology (IT) exists where the organisation's goals and activities are in harmony with the information systems (IS) that support them then whilst equally failure to leverage IT may seriously hamper a firm's performance and viability. Effective strategic alignment positively influences IT effectiveness; and leads to superior business performance. There is a lack of agreement as to how firms do and should align and writers warn that in real life organisations with differing organisational structures and business processes which are operating in alternative environments are likely to require different approaches to alignment. There is not 'one design fits all contexts' in alignment and despite a broad range of practical approaches having been considered it is clear that few cover the whole aspect and wider landscape of Information and Communication Technology (ICT) and business alignment. Whilst the literature research has identified a significant body of writing in support of ICT and business alignment the process used to achieve strategy alignment remains under-researched with limited evidence focused around public service ICT alignment, disagreement as to how alignment is optimally researched, and more widely a focus on theoretical rather than empirical studies.

Aims

The overall research question which is considered within this thesis is: What are the factors which could improve the alignment of ICT within public services at a time of economic recession which has required significant delivery transformation to achieve organisational efficiency and sustainable change?

Methods

A comprehensive literature review was conducted in order to identify factors associated with the ICT and business alignment, sources included literature from academic papers, business surveys and other sources from new domains. The second strand of the study was a longitudinal case study interviewing a number of participants involved in the inception, design and deployment of the solution utilising six research objectives for enquiry namely to: To assess what influences national policies and strategies have upon alignment of ICT and the NHS Wales; to identify factors important to alignment in NHS Wales including drivers, barriers, knowledge, individual motivation and beliefs; to explore the use of alignment models, frameworks, methodologies and best practice guidance; to explore the incidence of new approaches emanating from systems approaches, process improvements, critical success factors, and performance management frameworks; to identify the alignment enablers and inhibitors experienced within NHS Wales.

Results

The review of the literature was successful in highlighting some of the key issues that practitioners need to consider and address to improve alignment and provided an analysis of the methods and methodologies available to the practitioner, including those drawn from new domains of knowledge which demonstrated the complexity, variety and in some cases overlap of approaches within this field. The longitudinal case study highlighted two points of new significance namely the extended role of clinical champions and secondly the need to identify key pivot points where alignment decisions need to be made by the newly defined champion. The findings gave the opportunity to undertake three phases of comparison: firstly, an analysis of literature with available models (model and methodology applicability) where no one model was deemed ascendant in bringing knowledge and an aid to alignment decision making; secondly, an analysis of models and methodologies with the case study findings

(model and methodology usage) which suggested that, initially, no conscious use of methods methodologies or best practice was identified although on deeper examination the factors from the literature had been addressed and was evident from the reflections of the participants; and thirdly, an analysis of literature with the case study findings (literature issues validation) which highlighted the common aspects emanating from other writers and demonstrated their validity or otherwise with the case study. This provided the opportunity for the original conceptual model to be updated into a Public Sector Strategic Alignment Model to provide a more robust and relevant approach which would improve alignment of technology and services and once reformatted able to support practice with a more intuitive and iterative approach drawing together the strengths of current methodologies, characteristics from the literature and insight derived from the case study evidence

Discussion

The value of the study lies in providing a greater understanding of the components of alignment to be considered, the enablers and inhibitors drawn from external published surveys which are complemented by the experiences of participants drawn from a public service case study. In addition it furthers the debate over the extended role of clinical champions directly owning actions which are pivotal in achieving visions in a dynamic public sector informatics environment. Three distinct analyses have considered where: evidence from the literature is supported within the available methods and methodologies; evidence of available methods and methodologies being used is supported by case study findings; evidence from the literature is supported by case study findings. Finally, the study provides a practical Public Sector Strategic Alignment Model for users in the alignment field.

Acknowledgements

It is almost five years ago that, with trepidation, I took my first steps and stumbles into the academic world as an inexperienced researcher trying to understand the problems of ICT and business alignment in the public sector. I learnt the lows before the highs, the difficult balances which lie between home and study, the determination needed to grind down each seemingly impossible problem which presented themselves before me to finally experience the surprise and warmth of completion. I have been fortunate during my rite of passage to have had around me an outstanding line-up of people to encourage, motivate, moderate, and celebrate my development .... and to all of them I owe a huge 'thank you'.

Dr Paul Jones, my Director of Studies, whose fortitude was exemplified by the battles he undertook on my behalf to get the research approvals necessary for the health board. His impact upon my development went further than just reviewing drafts and adding constructive comments. He delivered continual encouragement throughout my time of study which gave me the confidence that I could express myself in this strange new world of academia and I consider myself fortunate to have had Paul as my DOS. This was complemented by the timely interventions of the workshop leads and supervisory team with special thanks to Dr Martin Rhisiart.

To the participants in the study from the world of audiology who were generous with their time and patience in response to my questions to spotlight the importance and highlight the unique qualities of their own alignment success over many years, I hope that this work does justice to their enthusiasm.

Transferred to other parts of the NHS Wales and Welsh Government (WG) but not forgotten, National Leadership and Innovation Agency for Healthcare (NLIAH), who were bold enough to recognise the importance of researchers bringing academic learning into

practice through contributions towards the DBA programme and personally supportive to allow me to embrace this unique opportunity.

Lastly, the family, who not only believed in me but were there every step of the way, inch by inch, imploring me to keep going and complete the distance. I know I couldn't always express why I wanted to undertake the doctorate but you always understood just how important this was to me for which I am also grateful. Fiona, who provided the sounding board for ideas, helped diagnose where I was going wrong with the software and became my thesis buddy to whom I could turn whenever I was desperate..love and hugs to a coach, friend and daughter who was always in regular contact.

Finally, a particular and special thanks, to my wife and best friend Rachel who made room for and shared her life with my 'hobby' and my increasing inability to answer simple questions with either yes or no.. we did it.... I look forward to regular quality time together, hope I can repay the sacrifice you have made, and am excited to start the next phase of our life and plans.

It may be time to draw a line under work related studies but the skills , knowledge and sense of achievement this experience has brought will transcend future problem solving... but honestly, all of those years ago...who would have believed it !

I'm glad I accepted this personal challenge and encourage others to do the same ... its never too late to start.

Certificate of Research

This is to certify that, except where specific reference is made, the work described in this thesis is the result of the candidate. Neither this thesis, nor any part of it, has been presented, or is currently submitted, in candidature for any degree at any other University.

Signed: 

Candidate

Signed: W P Jones

Director of Studies

Date: 01/10/2014

Table of Contents

Section Content **Page No.**

List of Figures

List of Tables

List of Acronyms

Acronym	Description
A&C	Administrative and Clerical
AGPM	Agile Project Management
AOF	Annual Operating Framework
AQF	Annual Quality Framework
BI	Business Intelligence
BPR	Business Process Reengineering
BSC	Balanced Scorecard
CAS	Consultant Audiological Scientist
CEO	Chief Executive Officer
CHIP	Corporate Health Information Programme
CIO	Chief Information Officer
CRM	Customer Relationship Management
CSF	Critical Success Factor
DNA	Did Not Attend
DOF	Director of Finance
DWAN	Digital Wales Advisory Network
DWP	Department for Work and Pensions
EMPI	Enterprise Master Patient Index
ENT	Ear Nose Throat
ERP	Enterprise Resource Planning
FoR	Frame of Reference
GF	Generic Framework
GP	General Practitioner
HB	Health Board
HCS	Health Care Standards

HI	Health Informatics
HIMSA	Hearing Instrument Manufacturer's Software Association
HOWIS	Health of Wales Information Service
HR	Human Resources
HRMC	Her Majesty's Revenue and Customs
HSS	Health and Social Services
IAF	Integrated Architecture Framework
IAG	International Advisory Group
ICT	Information and Communication Technology
IDCR	Integrated Digital Care Record
IFS	Institute for Fiscal Studies
IG	Information Governance
IHC	Informing Healthcare
IM	Information Management
IM&T	Information Management and Technology
IRAS	Integrated Research Application System
IS	Information Systems
ISDM	Information Systems Development Methodology
IT	Information Technology
ITIL	Information Technology Infrastructure Library
JIT	Just-in-Time
LHB	Local Health Board
LIMS	Laboratory Information Management System
MASW	Modernising Audiology Services Wales
MBA	Master of Business Administration
MHAS	Modernising Hearing Aid Services
MIT	Massachusetts Institute of Technology
MSP	Managing Successful Programmes
NADB	National Architecture Design Board

NHS	National Health Service
NIA	National Informatics Agencies
NISCHR PCP	National Institute for Social Care and Health Research – Permissions Co-ordinating Process
NOAH	Audiology Integration Standard
NWHA	North Wales Health Authority
NWIS	NHS Wales Informatics Service
OCS	Order Communications System
ODPM	Office of the Deputy Prime Minister
OGC	Office of Government Commerce
ONS	Office for National Statistics
P2M	Project and Program Management for Enterprise Innovation
PAS	Patient Administration System
PBSA	Public Sector Broadband Aggregation
PC	Personal Computer
PCIP	Primary Care ICT
PDCA	Plan Do Check Act
PDSA	Plan Do Study Act
PEST	Political, Economic, Social and Technological
PGM	Programme Management
PI	Principal Investigator
PJM	Project Management
PMS	Patient Management System
POTI	Processes, Organisational structure, Technology, Information
PS	Patient Safety
PSBA	Public Sector Broadband Aggregation
PSICT	Public Service ICT
PSSAM	Public Sector Strategic Alignment Model
QA	Quality Assurance

QM	Quality Management
R&D	Research and Development
RPIW	Rapid Process Improvement Workshops
RTT	Referral to Treatment Time
SAM	Strategic Alignment Model
SFI	Standing Financial Instructions
SIM	Society for Information Management
SIP	Service Improvement Project
SO	Standing Orders
SOA	Service Orientated Approach
SOURS	Statement of User Requirements
SP	Strategic Partner
SPK	System of Profound Knowledge
SPL	Strategic Project Leadership Framework
SQL	Structured Query Language
SSADM	Structured Systems Analysis and Design Method
SSI	Site Specific Information
SSM	Soft Systems Methodology
ST	System Thinking
TOC	Theory of Constraints
TPS	Toyota Production System
TQM	Total Quality Management
UF	Unified Framework
U.S.A.	United States of America
VC	Video Conferencing
VSM	Value Stream Mapping
WAG	Welsh Assembly Government
WAN	Wide Area Network
WCP	Welsh Clinical Portal

WOW	Ways of Working
WG	Welsh Government

Chapter 1- Introduction

1.1 Introduction

This introductory chapter provided an overview of the research thesis and a generalised introduction to the subject of alignment in the context of public services provided within NHS Wales. This thesis examines alignment with specific reference to the: conceptual and business literature; the models and methodologies used in practice drawn from existing approaches, supplemented by other writers established within their own field of practice; and analysis of a longitudinal case study surrounding a successful, value for money, deployment of a solution from within the NHS Wales public service.

Where effective strategic alignment occurs it positively influences Information Technology (IT) effectiveness (Galliers, 1987, Porter, 1987, Ciborra, 1997) and leads to superior business performance (Chan et al., 1997, Croteau and Bergeron, 2001, Tallon and Kraemer, 2002). Where the organisation's goals and activities are in harmony with the information systems that support them then strategic alignment of IT exists (Bleistein et al., 2006). Conversely, it is argued that failure to leverage IT may "seriously hamper a firm's performance and viability" (Avison et al., 2004, p. 224).

Understanding and leveraging the business–IT partnership allows organisations to use IT as a business strategy enabler and IT alignment planning has since emerged as a necessary task of many senior managers (Peak et al., 2005). Maes et al. (2000) suggest any further attempts to "install" alignment as a practical tool should consider amongst others: alignment as a dynamic process and at different levels, ranging from strategy to implementation; take the relevant business and technological contexts into account and pay clear attention to the human factors. Henderson and Thomas (1991) acknowledge that:

> *"... alignment means much more than the linking of information technology and business strategy (...) Fitting the technology, structures, processes, and skills to match this integration is also critical for success"* (Henderson and Thomas, 1991, p. 72).

IT alignment planning, with IT also referred to as ICT, is a process that enables organisations at all levels to achieve their objectives by delivering quality information from IT products and services (Peak et al., 2005). It involves the identification of requirements, delivery of information, products and services, and continual monitoring and measurement of the effectiveness of the system which also delivers a strategic view across a corporation by identifying requirements for new IT strategies and IT resources (Peak et al., 2005).

Within the research context funding is devolved from the Welsh Government (WG) to the Health and Social Services (HSS) which itself devolves an allocation to Local Health Boards (LHB) for funding of health services. Currently financial pressures are mounting with a potential annual funding gap between £1.3bn and £1.9bn by 2014-15. Planned changes in the way care is delivered will lead to reduced expenditure (Welsh Assembly Government, 2010). Therefore, business needs within the public sector in Wales are changing and in the NHS Wales sector an emphasis is being advocated to embrace systems thinking (ST).

Concerns will arise over the ability of the national programme for ICT in Wales to enable this approach based on its past history of not clearly aligning with the business strategy or even its own ICT strategy. The current transition plan to move from legacy solutions to future national solutions remains unclear. Political initiatives are beginning to gain precedence over other deliverables e.g. the need to deliver cross public sector initiatives such as data centres and common networks leading to back office economies. This is resulting in tensions as a move towards more command and control from national ICT programme occurs at a time

when local organisations are likely to want less interference or quicker and more flexible responses as a result of ST initiatives.

There is a lack of agreement in the literature as to how firms do and should align. Maes et al. (2000) suggest any further attempts to "install" alignment as a practical tool should take into account differing factors. Firstly, consider alignment as a dynamic process, involving continuous adjustment, and not as a static situation. Secondly, that alignment occurs at different levels, ranging from strategy to implementation. Thirdly, it must take the relevant business and technological contexts into account and paying clear attention to the human factors. Fourthly, it must not restrict alignment to managerial processes, but include design processes thereby distancing from the vision in which the management is able to determine every single aspect of the business - IT relationship. Finally, application should not strive "by definition" for harmony or balance between the different elements of the business - IT relationship, as this sustained lack of balance is the motor of many organisational innovations.

There is limited evidence around public service ICT (PSICT) alignment and more widely a focus on theoretical rather than empirical studies, but other aspects point to disagreement as to how alignment is best researched. Considering this paucity of studies and evidence around PSICT such an empirical study will significantly add to the knowledge base in the areas of ICT alignment in public services. The study was initially to address whether national strategies, structured approaches, methodologies, models when applied tend to influence or improve alignment between ICT and NHS Wales business services but on further reflection the overall research question which will be considered within this thesis is: What are the factors which could improve the alignment of ICT within public services at a time of economic recession which has required significant delivery transformation to achieve organisational efficiency and sustainable change?

Following further literature review this was developed into six research objectives for enquiry.

RO1 To assess what influences national policies and strategies have upon alignment of ICT and the NHS Wales.

RO2 To identify factors important to alignment in NHS Wales including drivers, barriers, knowledge, individual motivation and beliefs.

RO3 To explore the use of alignment models, frameworks, methodologies and best practice guidance.

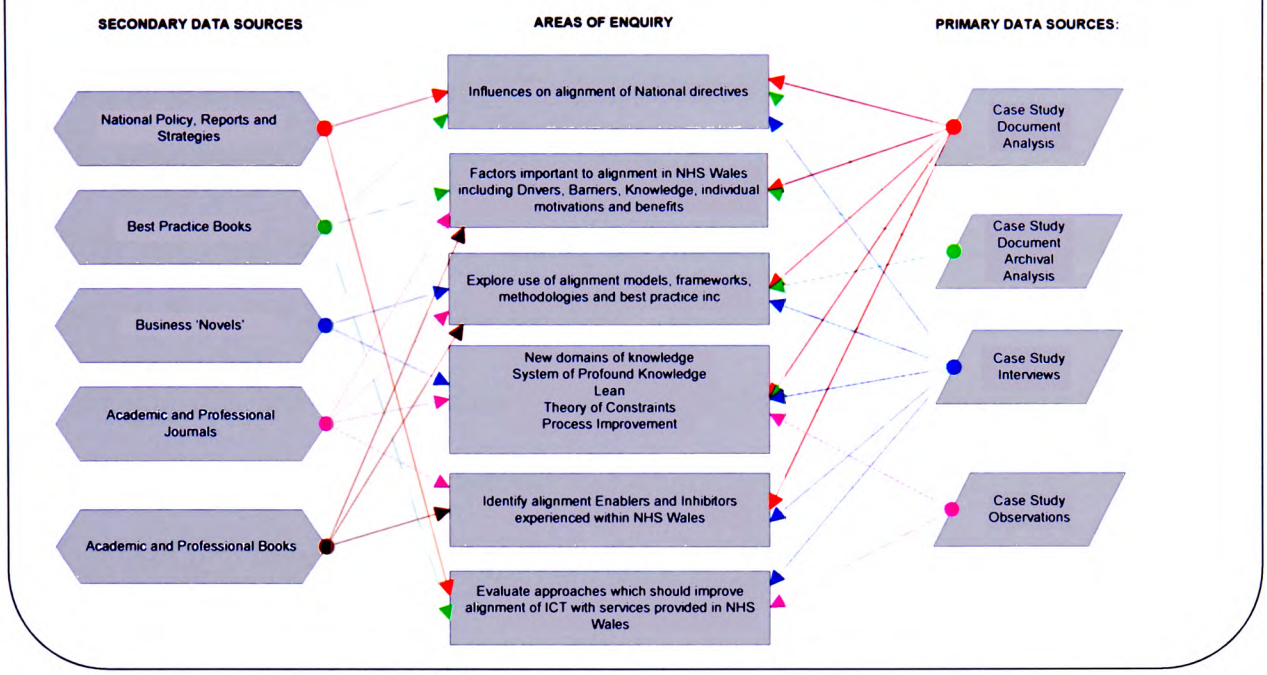
RO4 To explore the incidence of new approaches emanating from systems approaches, process improvements, critical success factors, and performance management frameworks.

RO5 To identify the alignment enablers and inhibitors experienced within NHS Wales.

RO6 To propose approaches which should improve alignment of ICT and the service provided by NHS Wales.

Building upon the evidence required to fulfil the research aim were sources drawn from a range of primary and secondary areas and these are encapsulated in a Knowledge Map (Figure 1–1).

Figure 1-1 Knowledge Map: Areas of enquiry and sources of information



A number of secondary sources were collated and analysed including alignment subject areas within academic and professional journals and books which were supplemented by best practice books, published surveys and a limited number of business novels. As indicated earlier there was acknowledgement that a paucity of studies and evidence around PSICT alignment existed and the introduction of an empirical study into the body of evidence was in turn a valuable addition. This was undertaken utilising a small case study, as explained within chapters four and five, to examine the interactions and experiences.

1.2 Synopsis of Thesis Structure

This chapter provided an overview of the research thesis and a generalised introduction to the subject of alignment in the context of public services provided within NHS Wales. It examined alignment with specific reference to the: conceptual and business literature; the models and methodologies used in practice drawn from existing approaches, supplemented

by other fields and practice; and analysis of a longitudinal case study surrounding a value for money deployment of a solution from within the NHS Wales public service.

Chapter two provided definitions considered within the concepts under consideration within this thesis namely public sector services, ICT, strategy, alignment, frameworks, models and evidenced practical approaches. In addition, the domain context of the study was provided with a profile of the Welsh public service, strategic approaches in Wales, NHS Wales Informatics Service (NWIS) alignment and implementation progress and also presented an international perspective of the Welsh informatics approach. The chapter concluded with a statement of the research question for the study which was taken forward into the literature review.

Chapter Three provided a critical review of the literature, commencing with a review of six themes which were used to structure the generated data relevant to the alignment area. These were: conceptual models can be traced back to fundamental academic writings in the 1990's (Scott-Morton, 1991); systems approaches and process improvements which have roots in Deming (1986, 1993); methods and methodologies covering academic writing and practical offerings; critical success factors drawn from academic literature and reported survey initiatives; performance frameworks; and information systems development methodology. This chapter concluded by formulating the areas of enquiry based around from the preceding literature which provided focus for the research question set out in chapter two.

Chapter four described the methodology employed within the thesis. After considering the available research paradigms, the appropriateness of a qualitative approach supported through a longitudinal case study case study was highlighted and linked with the formulated research question of the study and research objectives for enquiry. An appropriate case study was selected located in the Wales with a research design being concluded and encapsulated within

a research protocol which set out the parameters within which to address the research question and objectives for enquiry.

Chapter five provided a focused consideration of findings around alignment within the design, development, deployment and ongoing use of the auditbase solution. This was undertaken through a longitudinal case study based around the objectives for enquiry set out in chapter four. The objectives for each area of enquiry explored within the case study provided rich qualitative evidence to address the areas of enquiry formulated to answer the aims of the thesis.

Chapter six brings together the definitions, research domain and research question (chapter two), literature review and the research objectives for enquiry (chapter three), methodology of the study and selection of a research area (chapter four) and the findings from the longitudinal case study (chapter five) to inform the analysis and interpretation leading to key conclusions and the presentation of a Public Sector Strategic Alignment Model.

Chapter Seven identified how the research question has been addressed, the key implications for organisational stakeholders, assessed the contribution to knowledge and practice, the limitations of the study, and future opportunities that this research provided. Beyond this chapter, the appendices contained further resource material, including copies of the research analysis and the referenced and bibliographic sources underpinning this thesis.

Chapter 2 - Introduction to the Research Domain

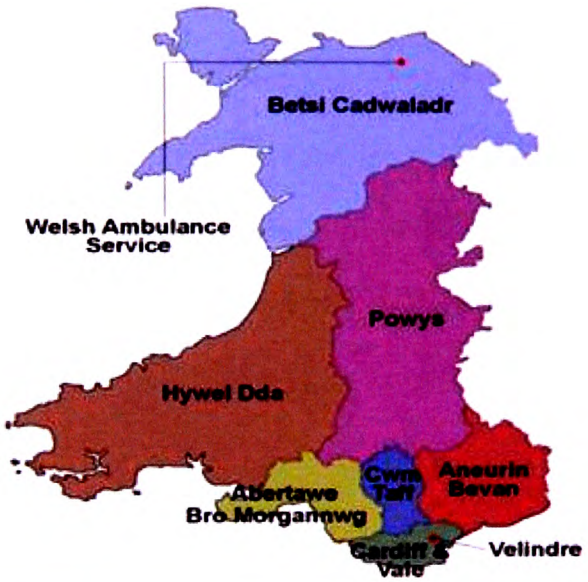
2.1 Exploring the issues

This chapter complimented the themes and aims introduced in chapter one by setting out the beginnings of the academic background to alignment as well as the challenges faced by the practitioner working within the NHS Wales environment. It introduced the WG's vision for the transformation of services within the public sector and drew definitions from the current academic literature to aid the clarification of terminology used within the research. This was supported with a contextual exploration of the Welsh policy direction indicating the public service and ICT strategies over the last 15 years which saw the emergence of technologies capable of bringing significant service change in the provision of NHS Wales. In addition, it reviewed the significant challenges which had contributed to the alignment of public services and ICT as technology and social expectations have emerged over the timescale. The literature examining the conceptual and practical alignment approaches was explored in more detail within chapter three.

2.2 Public Sector Services in Wales

The WG is the devolved government for Wales which enables policy and laws to be provided to the nation which is separate from the UK government and is responsible for most of the day-to-day issues for example health, education, and local government (Welsh Assembly Government, 2011b). Funding is devolved from the WG to the HSS which itself devolves an allocation to LHB's (Figure 2-1) to fund Health Services.

Figure 2-1 Illustration of New Health Boards in NHS Wales



The Institute for Fiscal Studies (IFS) has analysed the WG budget decisions since 2010 and has stated that the health budget has been cut by 8.6 per cent in real terms (BBC, 2013b). This was to address financial pressures with a potential annual funding gap between £1.3bn and £1.9bn by 2014-15. Planned changes in the way care is delivered will lead to reduced expenditure (Welsh Assembly Government, 2010). Within the devolved allocation is an amount for health ICT and a briefing (Thomas, 2009) indicated that external consultants had identified, as part of a wider review, that this level of funding across all of NHS Wales, at local and national level, was 1.83 per cent of the total spend. This showed that Welsh ICT investment compared poorly when assessed and ranked on an international basis.

This comment was consistent with previous work in *The Review of Health & Social Care in Wales* (Wanless, 2003a) which had found that expenditure on ICT accounted for less than 1 per cent of total NHS expenditure in Wales, around half the proportion in England (2 per cent - which was before investment in the Connecting For Health Initiative). The Wanless

aspiration, previously set out in a report for the U.K. government, was that the level of investment in ICT should rise to 4 per cent of the total NHS spending as

> *"without a major advance in the effective use of ICT, the health service will find it increasing difficult to deliver the efficient, high quality service, which the public will demand. This is a major priority which will have a crucial impact on the health service over future years" (Wanless, 2002, p. 102)*

In a report for the Welsh Government Wanless (2003b) recommended that in order to obtain better value for money for the resources allocated NHS Wales should action the following:

> *Development of a common health & social care ICT strategy; evaluate the benefits to patients and service users of investment in ICT; Ring-fenced funding (protection of these investment resources to ensure they are not diverted for other purposes); common standards and integrated systems (adherence to stringent national standards for data and IT that are set in a corporate manner)* (Wanless, 2003b, p. 7)

In order to achieve these recommendations a strategy was released *Making the Connections* (Welsh Assembly Government, 2004) which sought to gain economies of scale through greater co-operation and coordination between agencies (including and underpinned by ICT) across the whole of the public sector.

2.3 Strategic direction – NHS Wales

Paul Williams the Director General, Health & Social Services - Chief Executive, NHS Wales (2009 – 2011) commissioned work on developing a five-year Service, Workforce and Financial Strategic Framework for NHS Wales which far from being a rigid linear plan recognised the organisational complexities of NHS Wales. The assumptions acknowledged that forecasting and controlling future demand and resources was not possible so a

framework was set out for integration and transformation to "promote integrated thinking and working across NHS Wales and close collaboration with our partners" (Welsh Assembly Government, 2010, p. 2). The overall framework consisted of sets of documents (LHB delivery plans; local service delivery priorities), processes (improve quality of care; '1000 Lives Plus'; reduce harm, waste and variation) and behaviours (best practice from 11 national programmes; clinical engagement; meeting expectations) to facilitate achievement and provide governance of the goals (transformation of systems and services; transformation of people's lives). The framework, introduced in 2010, has since seen: the removal of the internal market; the development of integrated LHBs; reduction in the number of organisations; placement of public health centre stage; reduction in bureaucracy, transaction costs; new behaviours centred around collaboration, joint working, whole systems thinking and greater emphasis on quality and patient outcomes (Welsh Assembly Government, 2011a). Outlining the need for a set of values through the Annual Quality Framework (AQF) (Welsh Assembly Government, 2011a) the Welsh Assembly Government (WAG) stated:

> *"[It] may be counterintuitive, but I believe we need less command and control and centrally driven targets and more freedom for staff to innovate and improve services... I therefore want the emphasis in the future to be on a set of common values and on systems thinking which releases the potential of the organisation rather than chasing the target. I want to see continuous improvement .... integrated into everyday working and a new set of metrics developed which focus more on outcomes and quality."*
> (Welsh Assembly Government, 2011a, p. 1)

The values highlighted the need for: putting quality and safety above all else: providing high value, evidence based care for patients at all times; integrating improvement into everyday working and eliminating harm, variation and waste; focusing on prevention, health

improvement and inequality as key to sustainable development, wellness and wellbeing for future generations of the people of Wales; working in true partnership with partner organisations and with staff; and investing in our staff through training and development, enabling them to influence decisions and providing them with the tools, systems and environment to work safely and effectively (Welsh Assembly Government, 2011a).

Described as "transformation" the next steps included: organisations to deliver and self-monitor operational effectiveness (as a given) allowing the opportunity to significantly reduce central targets; systems thinking as a means of driving and maintaining continuous improvement embedded into everyday working; clinical leads and managers working together to inject pace into service improvement and innovation, General Practitioners [GPs] to have greater involvement in the planning and management of local services; more effective use of information; development of integrated health and social teams, with more joint appointments and pooled budgets with partner bodies (Welsh Assembly Government, 2011a). From an ICT perspective, this translated as having clear local targets for: common all-Wales ICT systems that support the safe and efficient delivery of integrated care; making enhanced use of new technology; encouraging NHS bodies to move away from traditional thinking and behaviour; making a quantum shift in performance that would generate learning that can then be applied to other areas; and provision of transparent information with care teams receiving regular updates about "their" patients (Welsh Assembly Government, 2011a). Practitioners working within this policy and strategy domain come upon terms with varying meanings not always consistent with their use and it was therefore important to first set out some definitions used within the study around strategy and alignment.

2.4 Strategy

One approach to transformation is through the definition and implementation of strategies. Writers on strategy agree that no consensus on a definition for strategy exists and describe it as: distinctive capabilities, differential, competitive, comparative advantage or simply organisations strengths and weaknesses (Mintzberg, 1990); direction and scope of organisation over the long term.... matching its resources to its changing environment and in particular its markets, customers or clients so as to meet stakeholder expectations (Johnson and Scholes, 1993). At a fundamental level, organisations exist for a purpose (Senge, 1990) and in the public sector the purpose is generally concerned with the delivery of a service and/or beneficial outcome in the public interest (Aritua et al., 2010). To achieve such outcomes, objectives or priorities will require strategic decisions to be made particularly in large public or private organisations. In regard to strategy implementation, Johnson and Scholes (1993) state that the major characteristics of strategic decisions are that they give rise to major changes and this needs to be considered and managed.

2.5 Alignment

Srivannaboon and Milosevic (2006) reviewed the literature to consider the idea of alignment in various management areas. They identified that numerous studies have discussed the alignment between tasks, policies, and practices whilst others have emphasized the relationship between alignment and performance in regards to organisational hierarchy: corporate, business, and function. ICT and project management (PJM) are similar to other functional strategies and should be aligned with the business strategy. The concept of linkage has been historically invoked as a metaphor to argue for the integration of business and IT strategies but is without adequate articulation or clarification of its characteristics (Avison et al., 2004). Although Luftman (1996), Burn (1997), Yetton (1997), and Hsaio and Ormerod (1998) provide some examples of enablers and inhibitors of alignment, the literature provides

minimal guidance on how to achieve alignment between business and IT strategies; the impacts misalignment might have on a firm; and what management can do to diagnose, achieve and maintain alignment (Luftman, 1996, Papp and Motiwalla, 1996).

Within a public sector context current guidance from Office of Government Commerce (OGC) Aritua et al. (2010) advises that the policy agenda should be kept in focus at the delivery end of benefits realisation. This is possible through a structured process which progresses from policy design, implementation through to operation and review. The policy should result in delivery of overall government strategies. Best practice in the whole life management suggests that the alignment between individual departmental strategies and the government strategies should result in change initiatives (Aritua et al., 2010).

Alignment also takes into account management processes and practices, coordinated planning capabilities, accountability processes, service level agreements, and organizational principles, culture, and structure (Peak et al., 2005). Maes et al. (2000) identified alternative terms in existence with which to refer to the phenomenon of alignment: balance (Henderson and Venkatraman, 1993); coordination (Lederer and Mendelow, 1989); fit (Venkatranan, 1989); linkage (Reich and Benbasat, 1993); and harmony (Woolfe, 1993). The evidence, Maes et al. (2000, p. 7) suggest, "refer to one and the same phenomenon, though their actual use does not contribute to its clarification". They suggest that it is defined in an indefinite and vague way which is a clear indication of the confusion and even misunderstanding that exists regarding the very concept of alignment and its goal. Luftman et al. (1999) later wrote that alignment addresses both doing the right things (effectiveness), and doing things right (efficiency). Within the public sector a third factor has to be considered, a need to spend less on inputs (economy) (Otrusinova and Pastuszkova, 2012). Luftman and Derksen (2012) later added that it was not a question of being aligned versus misaligned, but rather leveraging the

opportunities for enhancing the relationship among IT and business organisations to attain demonstrable success.

Pointing to the contradictions of these interpretations Maes et al. (2000) question whether it should be referred to as an outcome (final or temporary) as by the majority of authors (Broadbent and Weill, 1993, Barclay et al., 1997) or a process which leads to this outcome i.e. " alignment is not a one-time activity but a constant balancing act between a lead or lag strategy" (Burn, 1997, p. 85). At that time, being in the minority, the need to maintain alignment dynamically was only sporadically acknowledged (Coakley et al., 1996, Gunn, 1997). More recently, collective recognition has emerged (Chan and Reich, 2007) from studies published which emphasize that alignment is a process rather than an end state (Parker et al., 1988, MacDonald, 1991, Niederman et al., 1991, Baets, 1992, Powell, 1992, Broadbent and Weill, 1993, Henderson and Venkatraman, 1993, Norden, 1993, Baets, 1996, Baets and Galliers, 1998, Papp, 1999, Rondinelli et al., 2001). Chapter one introduced a summary of the suggestions from Maes et al. (2000) who warn that in real life organisations with differing organisational structures and business processes and operating in differing environments are likely to require different approaches to alignment. There is not 'one design fits all contexts' in alignment (Ciborra, 1997, Brown and Magill, 1998). Ciborra (1997, p. 74) suggests that understanding a system or a tool means "becoming so intimately familiar with it, so that it disappears from our alert attention, and becomes taken for granted, that is appropriated into the routines of our daily absorbed coping". With technology becoming more a background enabler in daily life then systems become aligned sufficiently that they disappear from our conscious behaviour resulting in the "better we 'understand' alignment, the less we will be able to represent it in our daily activities (it becomes embedded into our tacit knowledge)"(Ciborra, 1997, p. 74). Taken together the alignment of strategic priorities is often referred to as strategic consensus or strategic fit and has become one of the central

themes in the strategic management literature over recent years (Srivannaboon and Milosevic, 2006). However the definitions around strategy have a bias away from public sector service provision and this aspect was then explored in the next section.

2.6 Strategy in a Service Business

The predominant mental image of the workings within a business is one of a 'product-based' approach which leads to a product-orientated language thereby constraining the communications when attempting to manage a service business (Thomas, 1978). Service, an abstract and perishable quantity, is the primary entity with any transfer of physical or concrete product being incidental (Thomas, 1978). Consistent with the health service context the author outlines that the service is often produced and delivered by a single group of people which leans towards more of a decentralization of the service production process at a local level, where decisions are made, and a reduction in the opportunity for economies of scale. It can be deduced that delivery of information to these decision points will be a key factor therefore in the alignment requirements. In addition, Quinn et al. (1989) question the tendency for the internalisation of support costs which are treated as indirect and overhead expenses which, they suggest, are services although not treated conceptually as such when considering delivery options. They suggest intelligent out-sourcing or coalitions to improve productivity and long term competiveness particularly where reliance is placed upon smaller, state of the art product and service suppliers to shorten product-development cycles. However, Skaggs and Huffman (2003) draw attention to the type of strategy adopted by the service business can affect the uncertainty of their dealing with customers. They quote data from Tansik (1990) and Bateson (2002) which suggests that interactions with customers (clients) bring uncertainty into the organisations production (of service) processes. Jones (1987) and Shostack (1987) identify that this leads to a structural response to effectively cope with this challenge. This can be summarised in that providing a service due consideration

must be made as to the type of strategy adopted, relative to the level of uncertainty that this brings in customer interactions, which will influence the delivery of what information is required to these decision points and will therefore be key factors in the alignment requirements. They cite work by Norman (1984) who reported where information flows surrounding client-firm interactions become more uncertain, then more skilled employees are likely to be required to interpret information from customers and disseminate it properly through the production (service) process. This suggested an interesting reflection on empowerment and access to information processes would be possible when more recent work on ST was reviewed. Further considerations from Skaggs and Huffman (2003) highlighted three key differentiating mechanisms or strategic positioning for service firms being: service adaptability which involves the degree to which a firm alters its service output according to the desires of customers; service focus referring to the breadth of the overall service offering; and customer co-production where the customer is required to make a greater effort to receive the service offering. The latter point can result in standardising customer inputs and reducing potential variance in customer demands and has resonance with more current approaches which, although most of the examples appear dated, include self-check in for flights or at GP surgeries as obvious current day models. More recent debates over extending this principle is highlighted by King (2007) who draws attention to thinking in health services which recognise that patients, clients or customers should be co-producers of their own care. The importance and challenges to implementation of enabling information processes is now more effectively, yet not widely, understood by service managers who use the word technology within the direction statements as one of a number of terms which encompasses ICT, the detail of which is explored in the next section.

2.7 Information and Communication Technology (ICT)

ICT (Cambridge University Press, 2013) is used in this study in a similar manner to IT. It does however embrace the concept of bringing together the mediums of data, voice and other multi-media usually through one single network and system. It includes the technical means to handle information and communications using computer hardware, middleware, software as well as telephony, audio, video and network equipment. ICT's are powerful management support tools and can boost firms performance (Houy, 2005) although there use does not automatically result in improvements at an operational level. To be most effective, companies must embrace the implementation of ICT's with appropriate organizational changes (Houy, 2005). The ''IT-enabled'' strategic change approach merges with a range of issues from strategic management, organisational behaviour and operational improvement. Hsiao and Ormerod (1998) suggested that the study of the management of IT-enabled strategic change remained a relatively unexplored area. There is an opportunity to enable the Public Services in NHS Wales to achieve significant economies of scale (benefits) and underpin service changes to accommodate the reducing financial envelope. These require more effective alignment of business priorities to ICT requirements to provide enhanced outcomes and are themselves delivered in a timely and quality assured manner.

2.8 Industry trends in ICT

The recent Society for Information Management [SIM] annual survey (Luftman and Derksen, 2012) identified the top five application and technology investments as being: Business intelligence (BI), a clear standout and supported by the IBM MIT Sloan Management report that found companies that harness the power of large (referred to commercially as big) data and analytics outperform those that do not by 220 per cent (Luftman and Derksen, 2012); Cloud computing which over the next three years is predicted to see spending growth of 65 per cent coming from companies that make minimal or no use of the cloud today (Heric et al.,

2011); Enterprise resource planning (ERP) systems which provides a vehicle for reducing business expenses as companies leverage IT to reengineer business processes, assists business partners reduce costs and improve productivity; Collaborative and workflow tools driven by the demands for an increasingly mobile workforce incorporating internal and commercial software apps for use on employees tablets and smartphones; Customer relationship management (CRM) systems to organise, automate, and synchronise business processes related to customer service. From an external perspective, the citizens expectations and use of technology is changing which, linked with the pressures around the economy and the changing external technical environment, is driving a different way of interacting with the citizen in the form of on-line access to services bringing different strategic alignment perspectives and planning. Within the wider world investment continues within ICT across a number of applications and as part of its service provision in the wider public service the WG has stated that it wishes to move information services to the public (citizens) onto an online basis and this is explored in the next section.

2.9 On Line Services to Public

The context for online services to the public in Wales is set by the UK Government's direction to adopt a digital by default approach to delivery of government services (Cabinet Office, 2010) and within Wales the Welsh Government's Programme for Government (Welsh Government, 2011). The scale of the challenge is set out more recently in a statement by the Office of National Statistics (ONS) which said that four million homes in the UK are still not connected to the Internet (BBC, 2013a). Whilst the WG recognises the need to use technology to "provide better and more cost-effective and accessible public services for all our citizens, businesses and communities" (Digital Wales Advisory Network, 2012, p. 1) it is set against a backcloth of 25 per cent of Welsh citizens being considered as digitally excluded who are, according to the Digital Wales Advisory Network (DWAN), 'largely made up of

older people and the unemployed, who are without doubt the biggest users of public services' (Digital Wales Advisory Network, 2012, p. 1). Of the 68 per cent of people in Wales who do subscribe to broadband very few people use the Internet to access public services (Ofcom, 2012). An analysis of online public services in Wales by the Bevan Foundation (2011) highlighted the limited availability of public services online and where present appeared to be overly complex. The DWAN (2012) summarise the key challenges to be addressed include: what this means for citizens; how it is organised; and what the supporting infrastructure needs to look like.

Whilst it is recognised that health provision is predominantly delivered at the point of care an increasing amount of information, health education, signposting of services, shared communications are to be delivered through online channels. This suggests that future strategy, whilst working to commit to a policy to make online services in Wales the very best in Europe (Digital Wales Advisory Network, 2012), must consider whether it would work in Wales and for the purposes of this research what impact it may have on achieving alignment. In order to understand more fully the concepts around ICT alignment the next sections considered explanations provided by other writers in this field.

2.10 Strategic Alignment of ICT

IT alignment planning is a process that enables organisations at all levels to achieve their objectives by delivering quality information from IT products and services (Peak et al., 2005). It involves the identification of requirements, delivery of information, products and services, and continual monitoring and measurement of the effectiveness of the system which also delivers a strategic view across a corporation by identifying requirements for new IT strategies and IT resources (Peak et al., 2005). Effective strategic alignment positively influences IT effectiveness; (Galliers, 1987, Porter, 1987, Ciborra, 1997); and leads to

superior business performance (Chan et al., 1997, Croteau and Bergeron, 2001, Tallon and Kraemer, 2002). Where the organisation's goals and activities are in harmony with the IS that support them then strategic alignment of IT exists (Bleistein et al., 2006). There is some evidence that strategic alignment has other beneficial effects to provide: enhanced results (Reich and Benbasat, 1990, Henderson and Venkatraman, 1993, Chan et al., 1997); and efficient and effective support to a firms goals, objectives and activities (Lederer and Mendelow, 1989). An IT strategy requires alignment across the organisational hierarchy at the corporate, business unit, and functional level. These need to be aligned with and support business-unit-level strategies (further business strategies) (Srivannaboon and Milosevic, 2006) as evidenced in a study (Peak et al., 2005) which researched a corporate-wide alignment of the business level goals and associated IT with the IT Unit goals and priorities. It also allows managers and planners to define a course of action and develop an IT strategy to bridge the gap between IT reality and the strategic target (Peak et al., 2005). Maes et al. (2000) state that alignment is a concept looking to achieve the effective exploitation of IT resulting in the effective enabling (and not disabling) of the organisation. They warn that exploitation of IT in an organisation implies both strategic positioning and operational implementation. Any attempt at transforming the concept of alignment into a practical method will therefore need a reference framework incorporating strategic and implementation perspectives and as far as they knew, no such framework existed. Avison et al. (2004) referring to the previously mentioned concept of linkage in an IT context state that it has been historically invoked as a metaphor to argue for the integration of business and information technology strategies without adequate articulation or clarification of its characteristics. The focus of alignment also has conflicting propositions in that Henderson and Thomas (1991, p. 72) acknowledge that "... alignment means much more than the linking of information technology and business strategy (...) Fitting the technology, structures, processes, and skills

to match this integration is also critical for success" whilst other authors see alignment as the business and IT fit at the strategy level only (Barclay et al., 1997).

2.11 Importance of IT Strategy Alignment

Historically authors refer to the importance of alignment having been documented since the late 1970's (McLean and Soden, 1977, IBM, 1981, Earl, 1983, Brancheau and Wetherbe, 1987, Parker and Benson, 1988, Dixon and John, 1989, Niederman et al., 1991) and noted that it remains in importance as companies strive to link technology and business (Papp, 1995, Luftman, 1996). Avison et al. (2004) also record that it is a key concern for business executives and is ranked among the most important issues faced by IT executives. Commercial IT research organizations such as Gartner (Peak et al., 2005) have also listed IT alignment as a top issue of American companies. Drawing attention to its importance Avison et al. (2004) reference numerous industry surveys that reveal executives' perceptions of alignment, in particular Luftman's (1996) survey of 500 U.S.A. executives from 300 organisations, in which about half believed their organisations to be aligned. Writing in the seventh MISQUE-published reports (Luftman and Derksen, 2012), based on an annual SIM membership survey, the authors re-affirm that IT and business alignment, ranked 2nd behind business productivity and cost reduction, is a continuing management concern having been in the top three since 2003 and re-enforces the focus on obtaining business-related value from IT. They refer to a study published by A.T. Kearney (Eul et al., 2010) who list that to achieve the right level of IT spending, IT organisations need to work together with the business, the Chief Information Officer (CIO) need support of their Chief Executive Officer (CEO) and business peers as without such support CIO's cannot effectively deliver demonstrable value and address the factors that drive IT costs (Eul et al., 2010). Additionally, they cite the 2011 Gartner CIO Survey within which the responders perceived their strategies to be intimately connected with business strategies being a reflection of their objective to get closer to the

business (McDonald and Aron, 2011). Understanding and leveraging the business–IT partnership allows organisations to use IT as a business strategy enabler and IT Alignment Planning has since emerged as a necessary task of many senior managers (Peak et al., 2005). The resulting harmony can then be extended and applied throughout the organization. Tying the IT planning process directly to each business units' critical success factors (CSFs) (Peak et al., 2005) can lead to success of the initiative and ensure an integration of business and technology capabilities (Rockart et al., 1996). Avison et al. (2004) provide a useful summary of the importance and understanding of (IT) alignment stating that the literature suggests that firms cannot be competitive or successful if their business and information technology (IT/IS) strategies are not aligned. Conversely, it is argued that failure to leverage IT may seriously hamper a firm's performance and viability (Weill and Broadbent, 1998, Venkatraman, 2000). The issue of alignment remains a long-standing pervasive conundrum (Luftman and Derksen, 2012).

2.12 Challenges to IT Alignment Planning

Most models of alignment assume that organisations are built on mechanistic principles and that management uses structured, planning-oriented approaches to business objectives. In such firms alignment may work, but not in others (Avison et al., 2004). Whilst in general the approach to 'IT-enabled' strategic change is still rooted in formal planning (the plan-do-see-check model) and strategic portfolio planning (e.g. Earl, 1988) critics maintain that the implicit dominance of a structured strategy process is questionable in an era where such uncertainty and flexibility predominate, articulation of the strategic intent is difficult (Ciborra, 1997) and can distort creative thinking and misguide organisations that embrace it unreservedly (Mintzberg, 1987). Galliers (2004) draws attention to fundamental challenges: how to align ICT that is relatively fixed, once implemented in an organization; with a business strategy and associated information requirements that are constantly in need of

adjustment. Hsiao and Ormerod (1998) also refer to the turbulent environment requiring businesses to modify and extend traditional approach to change by transforming themselves into adaptive enterprises in order to confront and respond to increasing complexity and uncertainty. Issues in real life with real strategising is 'messy' with human thinking and actions rarely following strict modular concepts (Avison et al., 1999a, Avison et al., 1999b, McKay and Marshall, 1999). In addition, strategic alignment also presumes that management is in full control and that information infrastructure can deliberately be aligned with emerging management insights (Maes, 1999, Galliers and Newell, 2003). There is also disagreement as to whether strategic alignment should be viewed as an outcome (Porter and Millar, 1985, Earl, 1989, Weill and Broadbent, 1998) or as a dynamic process (Ciborra, 1997, Labovitz and Rosansky, 1997, Venkatraman, 2000). Smaczny (2001) claims that no studies focus on how organisations actually achieve alignment or whether alignment is the right way of looking at the issue. Finally some authors argue that strategic alignment is illusory, even inexpedient (Maes, 1999) or that IS alignment is not an issue in its own right. Smaczny (2001), assert that as IS are pervasive in business, they should not be regarded as separable from business strategy, and therefore the need for alignment does not arise. The next section sets out and considers the ICT strategies which have been influencing the development of ICT within the Welsh NHS and wider public services.

2.13 Influencing ICT Strategies in Wales

Better Information Better Health (Welsh Office, 1999) was the response to the white paper, Putting Patients First (Welsh Office, 1998). For the first time, the government set out its vision for future Information Management and Technology (IM&T) investments and officially reflected the importance of technology to underpin clinical processes and performance management by

> *'taking a comprehensive grip on the way we collect and use health information in Wales, so that we can improve the health of the people and the services they use' (Welsh Office, 1999, p. 1)*

The document set out 16 key targets many of which have been achieved over the long term (but not by the original timescale). Some targets were in conflict with other national changes e.g. convergence of informatics resources into centres working across health boundaries at a time when NHS Trusts were being established and competition for income between each other (GP Fundholding). All organisations had previously been responsible to Health Authorities and were defined as directly managed units but NHS Trust status, established through other statutory instruments, provided them with increased autonomy.

Although Better Information Better Health (Welsh Office, 1999) had targets no dedicated funding or national structure to co-ordinate and monitor progress through to its delivery were implemented. Some targets and national components which were directly linked to Welsh Office departments met with better progress e.g. Health of Wales Information Service (HOWIS), whilst progress in local organisations left considerable variations across the NHS Wales ICT landscape and was summed up four years later:

> *...modernisation and ICT programs in health care have not been well integrated; they must be closely aligned both strategically and in practice (Welsh Assembly Government, 2003, p. 10)*

Informing Healthcare Strategy – Transforming Healthcare Using Information (Welsh Assembly Government, 2003) announced the creation of a National Health Informatics Organisation which became known as Informing Healthcare (IHC) with a mandate to deliver the Improving Health In Wales vision (National Assembly for Wales, 2001) into practice through modernisation of health services in Wales using information and communication

technologies. This sat alongside similar programmes for Primary Care ICT (PCIP) supporting GP's and national departments such a Corporate Health Information Programme (CHIP) which considered, approved and mandated data sets for the production of information for operational and secondary (planning and performance) uses.

In 2009, alongside the LHB re-organisations, the disparate elements of the informatics community at national level started to come together under a new organisation NHS Wales Informatics Service (NWIS). This enabled a rationalisation of approaches particularly in the areas of support (hosting of hardware, service management) and design, development and rollout of standard software functionality across NHS Wales. The CEO of this organisation was also appointed as the CIO lead across the whole public sector within WG which paved the way to planning and delivering the *"Making the Connections"* (Welsh Assembly Government, 2004) objectives. The 2009 amalgamation of multiple organisations to create HB's had highlighted through ongoing surveys and dialogue (North Wales Trust, 2009) that many different technical architecture and portfolio of systems still existed. Not only that, but many of the new LHBs, being formed from separate organisations, still had different legacy systems from the previous amalgamation, and most used individually developed pathways of care and underlying processes.

2.14 Strategic Approaches so far in Wales

The early intentions of the National Strategy were for solutions to be procured by the national programme and offered to the health organisations within Wales. In the five years of its existence the organisation went through role changes initially commencing as a 'Design Authority' and producing a plan and business case to work with a commercial Strategic Partner (SP) who would provide the solutions through a procurement framework. The cost of such an approach prompted a re-evaluation and the focus changed into a design, development

and delivery organisation. More recently this has seen the addition of a co-ordinating responsibility with national and local development capacity and the emergence of a hosting service for the majority of systems in national centres. It was not mandatory for the rest of NHS to take the national products and some features made available were not unique, took too long to be released to the service or not felt to be priorities. Cost was always an issue within the financially constrained plans but, whilst an in-house development approach utilising national and local resources seemed to be more economic than a commercial partner, a formal evaluation, if one was undertaken, was not made publically available. Limited debate took place over the selection of which solutions which were to be provided and no clear link between deliverables and business strategies were published. An over-arching technical strategy was published based around the Service Orientated Approach (SOA) to reduce the potential risk around 'big bang' replacements during the transition from legacy system to nationally linked solutions. Further standards have emerged through publication of linked technology based strategies for; application (Informing Healthcare, 2009b); infrastructure (Informing Healthcare, 2009d); and security (Informing Healthcare, 2009c). They were written to support future delivery of new service requirements and potential changes in the future. However a document showing the link between the conceptual approach, business and ICT strategy alignment remained elusive. The approach to the business strategy has changed many times and this has led to an impact on the organisations objectives, structures, resource planning, skills and competencies and performance below its capabilities. Minimal evidence exists of how these strategic positioning changes were linked through and translated to ensure organisational delivery. The majority of the strategy was to be delivered through a national agency which in the early stages sat amongst a number of pre-existing bodies delivering aspects of technology and these are outlined in the next section.

2.15 NHS Wales Informatics Service and Legacy Organisations

IHC was set up to improve health services in Wales by presenting new processes through incremental service improvement projects in full co-operation and partnership with clinicians, local health communities, patients and public (Informing Healthcare, 2009a). It was set up as a project based organisation which utilised a matrix approach to resource management. It had several service areas covering: design (technical, clinical, information governance); delivery (implementation, service management); engagement (benefits, stakeholder management, and professional development of informatics); and corporate activities (procurement capacity, finance, human resources). To co-ordinate development the design arm of the organisation ran committees which developed, considered and mandated national approaches via a National Architecture Design Board (NADB). The delivery part of the organisation was broadly in two parts: a service management capacity which provides development, testing facilities and hosting and service support of national ICT systems; and an Implementation Directorate which managed the programme through four discrete sub-programmes. The Implementation Directorate was responsible for the strategic implementation focus and was run under a comprehensive structure of governance which was set up under a PRINCE2 framework (Great Britain. Office of Government, 2002). More recently the principles of Managing Successful Programmes (MSP) (Great Britain. Office of Government, 2007) approach has been increasingly adopted. Although described as the national programme the terms, processes and approaches to programme, portfolio and projects were used in an interchangeable manner. Resource management allocations were supported through a detailed planning and justification process which is considerably bottom up. However the allocation process is top down which can lead to considerable mismatches in the allocation process. This led to a constraint of resources at key times resulting in individuals multi-tasking which led to delays in project deliverables. The Programme, divided into delivery sub-programmes,

found their ability to interact within the wider environment limited with minimal empowerment to make decisions or commit resources within their attributed projects. As the environment or circumstances have changed the ability to respond has been restricted. This seems to have been a direct consequence of treating the sub programmes as projects with limited ability to make changes to scope, time or cost. Moreover, the benefits of managing resources between projects, such as portfolio management, were also highly restricted with a necessity to adhere to rigid change control procedures. This led to a highly centralised approach with large numbers of decisions being escalated up through the organisations (a project trait) and in some cases unstructured interventions (top down) introducing changes of project scope to address undefined external elements. Whilst the sub-programmes become aware of the changing environment they had limited knowledge over their importance to the overall programme. Differing messages from executive team members were received over whether products being implemented were tactical (short term) or strategic (long term). Interaction with the wider NHS Wales was therefore a programme level issue. Changes brought about by new initiatives were not always considered early and disseminated to projects. This was evidenced where introductions over Information Governance (IG) and Patent Safety (PS) review processes were added into the approval process for the programme well after many projects had neared completion. The question which arose was whether some of these challenges could have been more effectively mitigated through the deployment of structured approaches evident within published theory and methods used in day to day practice.

2.16 Alignment Frameworks, Models and Practical Approaches

The literature outlines a number of frameworks, models and practical approaches which can be employed to improve the alignment of IT and business strategies and these were explored in the following chapter three. As a relatively immature field the store of knowledge is not as

great in areas such as medicine or engineering and many generalisations are found which cannot be regarded as reliable knowledge (O'Brien, 1995). O'Brien further explains such knowledge as being categorised as: fundamental (matters which are central to the job); substantial (brainpower and concentration are required to master); widely accepted (known and used by most competent practitioners); and well proven (that they work). Furthermore O'Brien adds that, in practical terms, to arrive at sound decisions economically is a need to address any requirements as combining particular facts (about the situation and opportunities) with generalisations (e.g. principles, options, techniques) in order to arrive at particular decisions (relevant to investment decisions, strategy co-ordination). Concluding his categorisation O'Brien states that success is more likely when using the accepted principles and techniques. There is an expanding literature on IS project failures including both theory and case studies which is largely derived from the private sector despite the likelihood of failure appearing higher in the public sector. The costs are significant and it is estimated that around 20-30 per cent of IS projects are total failures and abandoned; 30-60 per cent partially fail; with only 29 per cent of projects succeed. In the public sector 84 per cent of projects fail (Gauld, 2007)

2.17 Welsh Alignment Planning

From a Welsh perspective the question remains as to the applicability and appropriateness of such methodologies within the public sector, where the importance of technology as such an enabler of business objectives has received increasing recognition over the years. As indicated earlier, NHS Wales has in the last 10 years introduced discrete ICT strategies and national ICT programme organisations which had not been well integrated (see Section 2.14) and at their inception reiterated other challenges faced:

> *'' ..... benefits to patients to be maximised; introduction of technology without change to working practices will have little impact and may miss important effectiveness and efficiency gains; new technology makes possible new ways of working that could not otherwise succeed''*(Welsh Assembly Government, 2003,p. 10)

The alignment of the 'business' or shared 'purpose' with the ICT delivery has been undertaken with no structured methodologies being articulated or used to align service and ICT strategies. An initial set of projects were put in place as pilots but the analysis of those selected for further development were linked to the furtherance of a conceptual vision rather than to business requirements. Later attempts to align current products to strategy have been retrospective studies rather than published and integrated approaches. Interaction with the wider NHS Wales is a Programme level issue and changes brought about by new initiatives were not always considered early and disseminated as projects. To improve alignment, stakeholder management took place at differing levels. These ranged from representation by; individual clinicians; national and local health organisation nominees; and professional representatives, at national committees or a presence on national projects. The communication emphasis has changed over time from extolling the benefits of national approaches towards insisting that organisations adopt the products and services which the national organisation is offering. What was clear in terms of alignment was the gap between the service operators at local level and the design process itself which was undertaken through the NADB and did not address the diversity or impact of local processes. Whilst the national solutions were in development, which included delays in delivery, locally based organisations have been consistently developing their own solutions based on their own analysis, alignment and development plans although, as stated earlier, local organisations now need to commit to the national approach. The WG has placed increasing importance on the need to measure activities before intervention as part of the modernisation initiatives. The

early IHC approach was to only consider the requirement to provide data to clinicians for clinical decisions and management of care and not that of 'secondary uses'. Although the information principle has been to collect performance data as a by-product of operational activities few initiatives yet undertaken has this as a deliverable component within development and project outcomes (Welsh Office, 1999). More recently, enforcement through national performance criteria have been imposed on the new HB's through the Annual Operating Framework (AOF) which has set out for local health organisations clear objectives over the implementation of national product and services. This is monitored by the WG through the NHS Wales CEO's of the health boards as part of a performance monitoring framework. Local organisations now need to commit to the national approach.

2.18 Implementation Progress

Progress towards delivery of national solutions to a local level has been slow. Early investment was made in areas such as readiness which consisted of improved investment in networks, initiatives to address data quality and a number of small service improvement projects (SIP). These SIP's were used to identify whether the solution would be feasible and scalable before major investment was made to a national size development and roll-out. However the link between business requirements, SIP's and the current portfolio was unclear. The importance of combining the planning of national and local programmes and projects were recognised in 2010 and embracing aspects of MSP a high level outline of the necessary transitions were formulated and shared across the ICT community hosted at a national level. These were to some extent an initial view of the changes that would be required against timelines for development of national products and services. What became evident in this work was the considerable understanding of the business requirements that would be required to map the interdependencies of both the ICT solutions but also of the HB's where examples of parallel implementations based on local requirements were not achievable by the national

teams. Continual refinement on the 'roadmaps' continued into 2011 still hampered by resource constraints at national and local levels. In addition, the initial prioritisation of some national projects had unintended consequences as lower priorities were found to be key dependencies for the advancement of higher priority ones. Gaps of significance were identified later in the planning process which would also delay potential implementations. At a local level, the requirements identified were partly fulfilled by other solutions which ran the danger of not being 'strategically compliant'; however there were some significant success stories. A number of products were within the portfolio (Table 2-1) and one of the biggest development challenges which emerged was the Welsh Clinical Portal (WCP). The transition of the software solutions from pilot to a usable (known as production) version has produced significant issues leading to later delivery than planned (4yrs). Many local organisations already had similar solutions in place. The impact and complications of interdependencies between national products were also put into sharp contrast when the national procurement of a Laboratory Information Management System (LIMS) was being configured leading to delays of already over two years (2011-2014). In other areas, good progress has been made where the development and governance has been limited due to solutions being pre-existing products which could be tailored to NHS Wales. Supporting cross public service initiatives, the most ambitious to date, has been the Public Sector Broadband Aggregation (PSBA). This has also led to further cross sector opportunities with use of a national framework contract of standard encryption products and services; and the wider availability of a national email and directory service.

Table 2-1 Current Product Portfolio NWIS

National Product	Brief Description
Welsh Clinical	Secure web based health space which both supports routine care tasks and unites key information, such as pathology, radiology,

Portal (WCP)	cancer and GP data, from the various computer systems in NHS Wales (Informing Healthcare, 2009a).
Welsh Clinical Communications Gateway (WCCG)	A referral management solution between GP Primary Care and Hospital Secondary Care (developed by NHS Scotland);
Individual Health Record (IHR)	A product which enables visibility of GP Records to support the out-of-hours service (developed by GP suppliers);
Public Sector Broadband Aggregation (PSBA)	A WAG led collaborative national communications service that, in conjunction with other major Welsh public sector organisations, has created a national information and communications platform (Logicalis and Welsh Assembly Government, 2010). Provided by a commercial supplier.
Laboratory Information Management System (LIMS)	An information system which provides the Pathology laboratories with management, operational, demand and performance information. The new generation also has workflow capabilities with enhanced integration into analysers and other computerised pathology activities. Provided by a commercial supplier.
Enterprise Master Patient Index(EMPI)	A demographic index which is capable of linking to industry standard demographic systems to identify the presence and linkages of patient records across a health board. Provided by a commercial supplier.

As part of improving communications and accountability NWIS and its predecessor organisations had issued a number of achievement reports with the most recent indicating a continuation of progress across key areas (Informing Healthcare, 2009a).

2.19 Comparisons with ICT in NHS England

The very nature of public life provides a set of organisational and political influences to projects that private sector planners may not have to deal with (Gauld, 2007) and the delivery of the national ICT infrastructure in Wales has experienced delays which is in common with other home nations such the Connecting for Health Initiative (NHS CFH) (NHS Connecting

for Health, 2013) in England. Here, links between user expectations and solution delivery, has also been disjointed (Public Accounts Committee, 2009) and an increasing necessity in practice to manage uncertainty and change. The English national programme has undertaken several changes since the report and a revised vision for a fully integrated digital patient record across all care settings by 2018 in NHS England was announced in July 2013 (NHS England, 2013) and breaking away from the previous experiences (Public Accounts Committee, 2009) highlighted a different approach towards adoption.

Firstly, it indicated that local organisations and partnerships are optimally placed to make key investment decisions that add capability in IT in line with local context, operational and strategic imperatives. Secondly, it highlighted the criticality of having clinicians at the heart of the decision making and implementation process to drive forward introduction and use of integrated digital care records. Thirdly, it stressed the importance of core architectural principles and information standards universally being adopted regardless of the alternative roadmaps different care communities follow. Fourthly, it emphasised the critical role that IT leadership and informatics expertise to invest wisely, scale effectively and sustainably. Finally, it set out the need to support local solutions within a framework of national standards and outcome orientated clinical capabilities.

Elsewhere, the report suggests that implementation projects should be designed so that clinical users of new Integrated Digital Care Record (IDCR) system can see the benefits for patient care and their working practices as soon as possible. This can be profiled in project planning by delivering short term (maximum six months) modular components with associated step improvements (NHS England, 2013). In support the report outlines reflective practice and encouraging peer review as the key to driving up adoption of an IDCR by clinicians and realising the benefits.

2.20 An International Perspective

An independent viewpoint has been provided by the International Advisory Group (IAG) which has been made up over the years with a mixture of professionals from Canada, the Netherlands, England, Ireland, Northern Ireland, Denmark, Scotland and the United States of America (U.S.A.) who have met in Cardiff to evaluate and advise IHC. Over three visits between 2006 and 2009 they outlined points which they wanted IHC to take onboard to improve its health ICT strategy. Although quite wide ranging they had the following to state in regards to their view over strategic alignment:

In 2006 they recommended that:-

> *'.....IHC develop an investment schema or plan that shows when, where and why the investments in the coming years will occur... (Informing Healthcare, 2006, p. 1)*

and

> *'..... look to use the strong strategic alignment with the overall health strategy to identity, quantify and evaluate benefits more explicitly.....This will and should require a commitment and 'buy-in' from the Regions and trusts.....' (Informing Healthcare, 2006, p. 4).*

In the 2007 report they commented:-

> *'The IAG often wondered - is there a Welsh e-Health strategy? There should be one; otherwise how can Wales have a joint vision if no joint strategy exists and is consistently referenced as to where we are headed and why? The strategy should also specify the division of work -- who is going to do what on the journey, what the rules and expectations of the journey are, how priorities are going to be set and who will be a part of that decision making process; when specifics events are expected to occur,*

> *and what financial and human resources – both national and local -- are going to be needed if the journey is to progress to the next stage. The lack of an explicit strategy also makes it difficult for individual communities to know how their in-house systems could be made to integrate with the long-term design.'* (Informing Healthcare, 2007, p. 4).

The final report from the IAG in 2009 (Bruce, 2009) has yet to be published and the only external view was given through journalists who stated the IAG had made nine points which included that they

> *''.....believed there needed to be a formal evaluation strategy so measurements and comparisons could be made on how well informing healthcare is doing* (Bruce, 2009, p. 1).

2.21 Summary of the issues in the Research Domain

Political initiatives are driving forward health service transformation, the key agenda item to address the financial austerity constraints, which is taking place in an evolving external environment which encompasses changing technical and social factors thereby affecting perceptions and use of technology by the public. The published direction was to promote integrated thinking within Wales and ensure closer collaboration which required the production of consistent Health Board documents, processes and behaviours which would reduce harm, waste and variation whilst at the same time reducing command and control through central targets. This highlighted the importance of system thinking (Welsh Assembly Government, 2011a) and the necessity to utilise process improvement approaches to integrate continuous improvement into everyday working. What was less clear was the different approaches which could have been adopted or whether the quoted approach (ST) was an appropriate selection to deliver improvements. This drove a line of enquiry which set out to

consider what structured approaches existed, whether one size would fit all and what evidence existed to support their use. Reference was made to the changing environment outlining a need to be able to cope with uncertainty, where the business strategy and information requirements were in continual need of adjustment. The literature suggested some of these approaches could be derived from conceptual models although as Maes et al. (Maes et al., 2000) warned any attempt at transforming the concept of alignment into a practical method would therefore need a reference framework incorporating strategic and implementation perspectives and as far as they knew, no such framework existed. Other writers refer to approaches that tie the IT planning process directly to each business units' critical success factors (CSFs) (Peak et al., 2005) can lead to success of the initiative and ensure an integration of business and technology capabilities (Rockart et al., 1996). The research domain also highlighted factors which would need to be considered: how to closely integrate modernisation and ICT programs aligned both strategically and in practice; was there a need to take the relevant business and technological contexts into account; should there be an attempt at measurability; should attention be paid to the human factors; what levels of governance would facilitate achievement in transforming systems and services required and ensure stimulation of innovation and improvements; and the need for true partnerships with stakeholders. The English experience had contributed additional challenges to the way alignment can be facilitated over: where key investment decisions should be made; where clinicians should participate in the decision making and implementation process of integrated digital care records; whether core architectural principles and information standards have a place; what importance IT leadership and informatics expertise is required and what role national standards have on outcomes of clinical capabilities.

2.22 Summary of the issues in the Research

The study embraced these uncertainties and to address them considered whether national strategies, structured approaches, methodologies, models when applied tend to influence or improve alignment between ICT and NHS Wales business services. On further reflection the overall research question which will be considered within this thesis is: What are the factors which could improve the alignment of ICT within public services at a time of economic recession which has required significant delivery transformation to achieve organisational efficiency and sustainable change? This needed a further expansion of knowledge before the research objectives could be developed and this was achieved in the following chapter where the literature for definitions, explanations and evidence was examined.

Chapter 3 – The Literature

3.1 Exploring the Literature

Chapter two drew upon definitions to support some of the terminology used within the research domain and highlighted the need to explore the underlying concepts and definitions of alignment. In addition, it highlighted the current questions about the use of methodologies by the practitioner to support transformation some of which emanate from other fields of knowledge and practice. This identified a suggestion of overlap and led to the need for a more comprehensive understanding of the basis, structure and development of more widely quoted approaches alongside practical knowledge in the form of factors more likely to deliver successful alignment outcomes. It accepts that alignment is a necessary outcome and considers whether any approaches, frameworks or methodologies are represented within the literature which particularly reference strategic alignment of ICT within public services.

This chapter initially investigated the available academic literature to identify the key concepts being considered by the thesis centred on conceptual and practical approaches to alignment. A review of existing literature was undertaken primarily in October 2010 with further work undertaken in August 2014. This commenced with an internet search using the criteria of 'business and information technology alignment models' in order to elicit the key authors, evidenced by citation references, in this area which proved helpful to inform the researcher in addressing the literature via more peer reviewed sources. In addition to journals and editorials available through academic search engines, consideration was given, where available, to conference proceedings, working papers, book chapters, dissertations, good practice publications and business novels. The online databases were accessed via the university and search terms used are outlined in Appendix A - Table A-1. This sets out the databases accessed, search terms used, filters and document areas specified, the results (hits), number of documents previewed and date of the searches. The results initially had varying levels of commonality with the subject research area and the initial filtering was undertaken

by examining primarily the title and the abstract. Having identified publications that were related to the research a preview of the full text of each paper was undertaken to eliminate those not relevant to the research. A number of key alignment model authors emerged from this review particularly from the era around the initial deployment of technologies and this concurred with the citation review undertaken earlier. The key points which emerged from this review was the lack of more recent publications since the early discussions around alignment and the extreme paucity surrounding studies or work in the area of the public sector. Later work around the information system development methodologies also highlighted a shortfall in this public sector area as well as revealing the diverse number of approaches taken. Focus in this case was achieved by concentrating on the identified key authors of ISDM evidenced in the literature. In all cases a review of the citations in the selected publications was undertaken for articles that were overlooked and should be considered. Finally, two further searches were undertaken within the British Library section on stored thesis and a specific search across a number of UK government department websites for national publications. The approach produced a relatively comprehensive picture of the subject areas under review areas under review (Bubenko, 1986, Deming, 1986, Lyytinen, 1987, Ohno, 1988, Checkland, 1990, Davenport and Short, 1990, Henderson and Venkatraman, 1990, Womack et al., 1990, Henderson and Thomas, 1991, Scott-Morton, 1991, Davenport, 1993, Deming, 1993, Hammer and Champy, 1993, Henderson and Venkatraman, 1993, Luftman et al., 1993, Jayaratna, 1994, Avison and Fitzgerald, 1995, Davenport, 1995, Wynekoop and Russo, 1995, Luftman, 1996, Russo et al., 1996, Avison and Taylor, 1997, Ciborra, 1997, Luftman, 1997, Stapleton, 1997, Checkland and Holwell, 1998, Fitzgerald, 1998, Iivari et al., 1998, Checkland, 1999, Luftman et al., 1999, Iivari et al., 2000, Maes et al., 2000, Avison and Fitzgerald, 2003, Avison et al., 2004, Goldratt and Cox, 2004, Beck and Andres, 2005, Peak et al., 2005, Siau and Tan, 2005, Huisman and Iivari,

2006, Chan and Reich, 2007, Iivari and Huisman, 2007, Zokaei et al., 2010, Dingsøyr et al., 2012). In addition, the reviews of good practice publications which were relevant to the research area highlighted (Pellegrinelli, 1997, Seddon, 2002, Seddon, 2003, Kaplan and Norton, 2004a, 2004b, 2004c, 2004d, 2004e, Seddon, 2005, Luftman et al., 2006, Radnor and Walley, 2006, Radnor et al., 2006, O'Connell, 2007, Radnor and Bucci, 2007, Seddon and Caulkin, 2007, Kaplan and Norton, 2008, Luftman and Kempaiah, 2008, Radnor and Walley, 2008, Seddon, 2008, Seddon and O'Donovan, 2010a, 2010b, Luftman and Derksen, 2012). The number of areas reviewed has resulted in a considerable number of prime and secondary references which are all included within the bibliography.

3.2 Boundaries of the literature review on the approach to alignment

Several approaches and underlying principles were introduced in chapter two which did not immediately demonstrate any linkage between service requirements and the technology planning to facilitate the desired outcome.

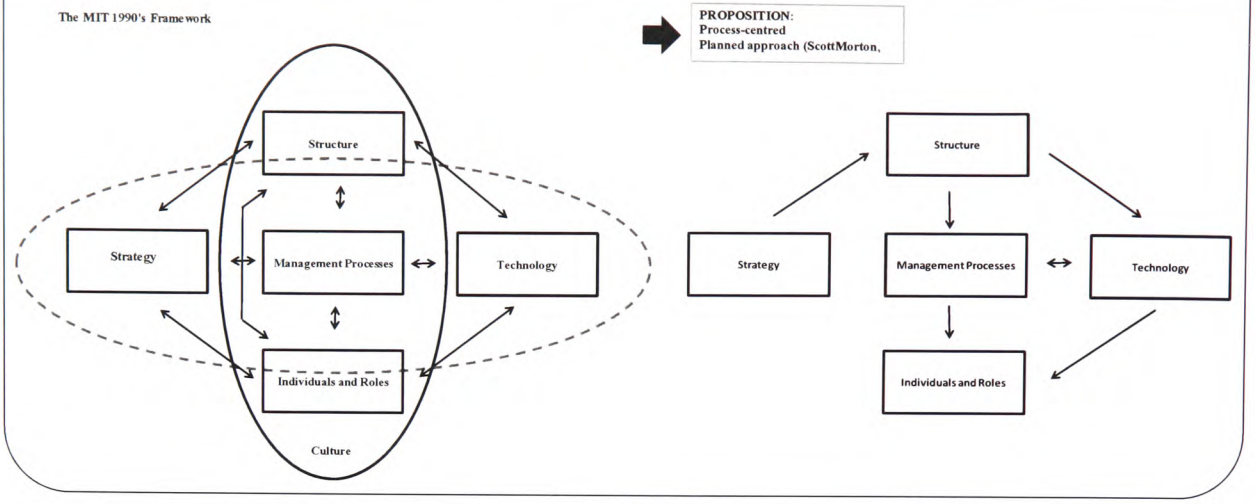
The literature review identified six broad themes which were used to structure the considerable amount of literature generated by the university provided search engines and these are set out in summary. The first theme is alignment via a conceptual model which traced the academic routes of early attempts to bring rigour to a new field in the 1990's through to additional elaborations by later writers. Secondly is alignment via a systems approach which emanated from Deming drawn from his work in the post war Japan. Thirdly is alignment via a method or methodology which drew from and considered a number of approaches outlined by writers, practitioners and professional bodies. Fourthly is alignment through a critical success factor which considered the value of identifying enablers and inhibitors to alignment. Fifthly, alignment via a performance management framework, integrated strategy into a performance framework matrix to closely track progress towards

achievement of strategic objectives. The final theme, Information Systems Development Methodology (ISDM), draws on the literature to highlight the knowledge published around the value of a disciplined approach to the building of information systems within an increasingly dynamic business and technological environment. It was recognised that some approaches that were considered had an overlap and could be placed in more than one of these themes but the raison d'être was to make sure they were assessed rather than the complete accuracy between the groupings. The initial review work focussed upon the published approaches around conceptual models for alignment and this is presented within the following section.

3.3 Alignment via a Conceptual Model

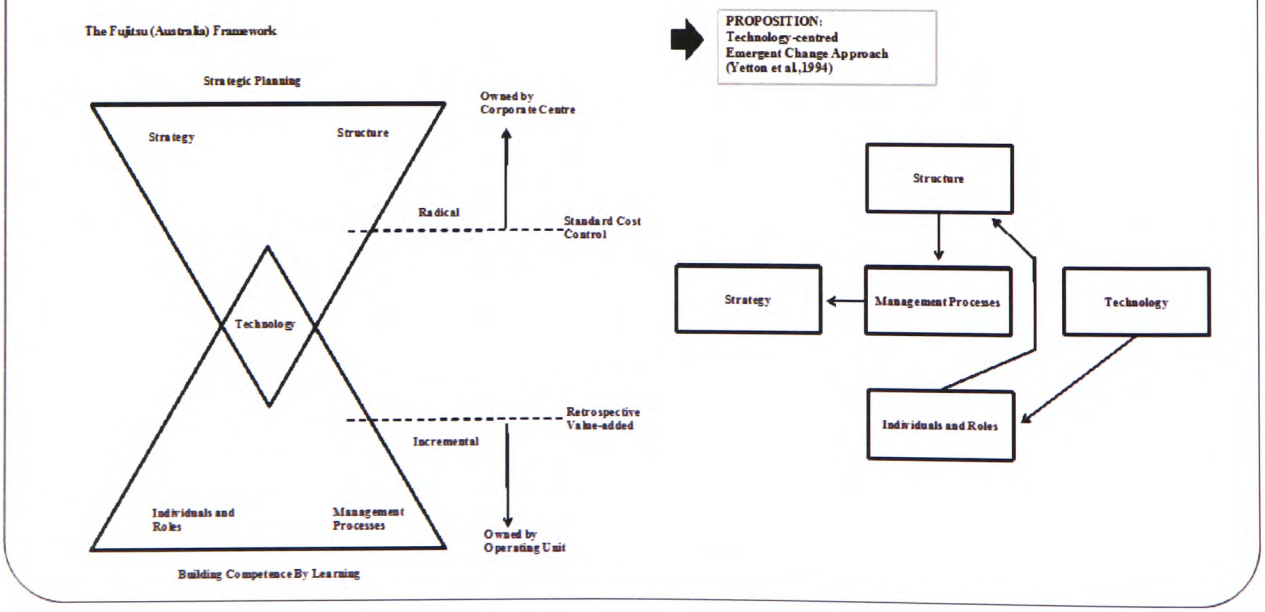
One of the initial approaches was from the Massachusetts Institute of Technology (MIT), who ran a 'Management in the 1990's' research project (Scott-Morton, 1991) designed to achieve conceptual integration between the different change factors and were embedded in a framework for managing IT-enabled strategic change (Hsiao and Ormerod, 1998). Scott-Morton identified five key elements of change: strategy, individuals and roles (human actors), structure, management processes, and technology. These elements are pictorially presented in Figure 3-1.

Figure 3-1 The underpinning research theories (Hsiao and Ormerod, 1998)



Yetton et al. (1994) advanced and built on Scott-Morton's strategy-driven and process-centred approach by proposing a different perspective (technology-centred) evidencing an emergent mode of change. This mapped a dynamic path and incorporated a mode and rate of change into an explanatory framework (Hsiao and Ormerod, 1998). These elements are pictorially presented in Figure 3-2.

Figure 3-2 The underpinning research theories (2) (Hsiao and Ormerod, 1998)



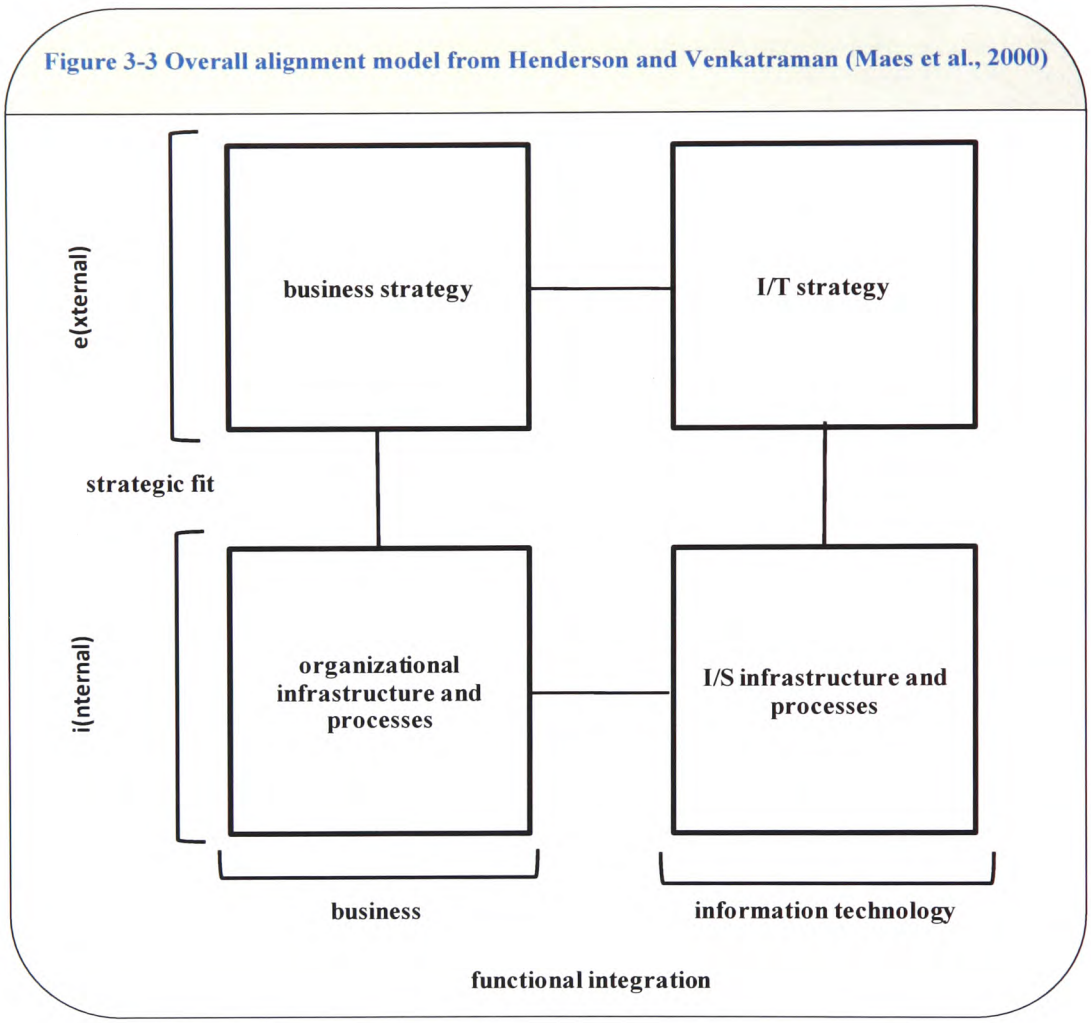
3.3.1 Strategic Alignment Model

Quoting Scott Morton in 1990, Henderson and Venkatraman highlighted one of the central messages from the MIT's Management in the 1990s Research Project (Scott-Morton, 1991) had been that successful organizations could be distinguished by their ability to leverage IT capabilities to transform their businesses (structures, processes, and roles) to obtain new and powerful sources of competitive advantages in the marketplace. Looking for fundamental insights and guidance from existing frameworks they reflected on their limitations noting that the administrative role is supported by frameworks such as: Critical Success Factors (CSF) (Davis, 1979, Rockart, 1979), and the operational role was supported by frameworks like: Business System Planning (IBM, 1981) or Value Chain analysis (Porter and Millar, 1985). None of these frameworks provided sufficient differences or insights to leveraging the competitive role (Henderson and Venkatraman, 1990). Having considered this deficiency they quoted other frameworks which purported to address the challenge of recognizing the competitive role of IT. These include: Parsons' (1983) articulation of different levels of impact of IT in the marketplace; McFarlan's (1984) adaptation of Porter's competitive strategy framework to a context characterized by the deployment of IT applications; Rockart and Scott Morton's (1984) adaptation of Leavitt's (1965) organization theory model; and frameworks rooted in a set of convenient dimensions (Wiseman, 1985, Hammer and Mangurian, 1987).

Useful for describing and highlighting the emerging interconnection between IT capabilities and organizational actions, Henderson and Venkatraman (1990) argued that the frameworks failed in their lack of articulation of the fundamental logic and rationale for exploiting IT capabilities as well as the complexities of the organizational transformation required to leverage technological capabilities. More specifically, they failed to simultaneously address the business (external) and organizational (internal) requirements of transformation enabled

and shaped by new and powerful IT capabilities. This led to their developed model for research and practice of strategic management of IT (Figure 3.3).

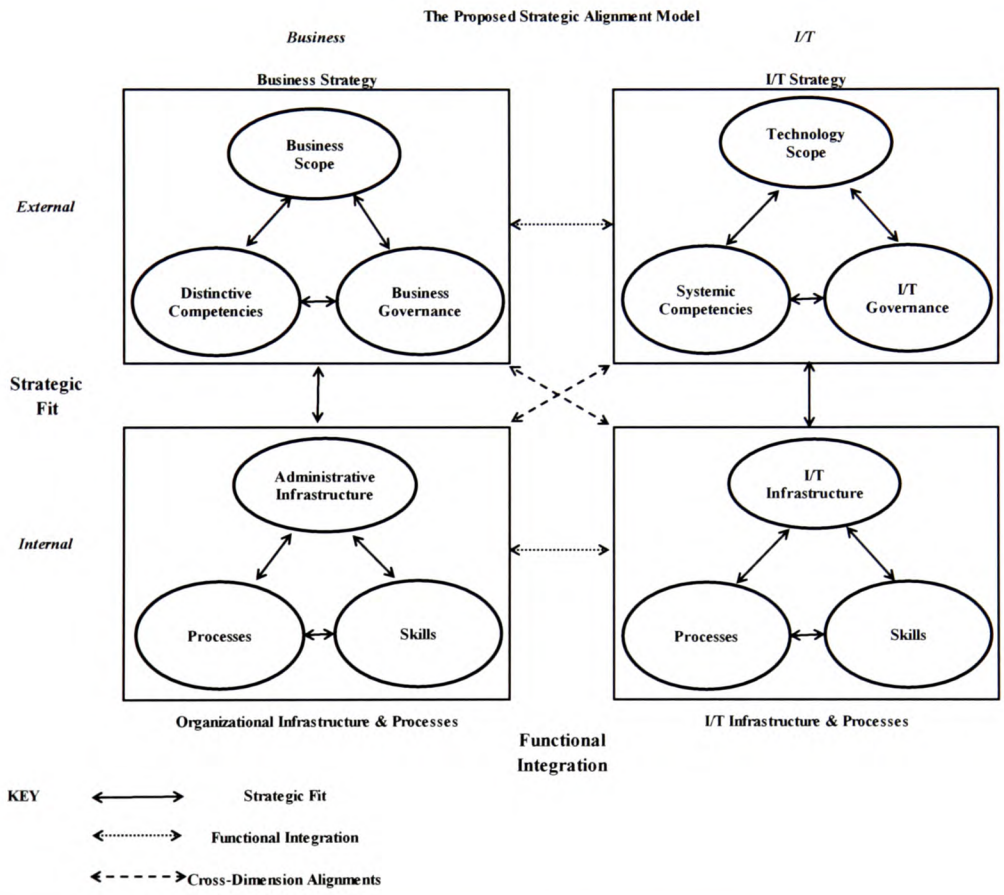
Figure 3-3 Overall alignment model from Henderson and Venkatraman (Maes et al., 2000)



The later version, which they termed the Strategic Alignment Model (SAM), draws a distinction between the external perspective of IT (IT Strategy) and the internal focus of IT (IT Infrastructure and process). The model (Figure 3.4) is defined in four domains of strategic choice: business strategy, IT strategy, organisational infrastructure and processes, and IT infrastructure and process (Avison et al., 2004). Each has constituent components: external level - scope, competencies and governance; internal level – infrastructure, skills and process. The model attempts to consider the interrelationships between external and internal domains (strategic fit) and integration between business and technology domains (functional integration) (Avison et al., 2004). Thereafter, Henderson and Venkatraman (1993) outlined

the potential strategic impact of IT which required both an understanding of the critical components of IT strategy and its role in supporting and shaping business strategy decisions; and a process of continuous adaptation and change. Henderson and Venkatraman (1993) then presented the more referenced version of the SAM that Maes et al. (2000) defined as the range of strategic choices facing managers.

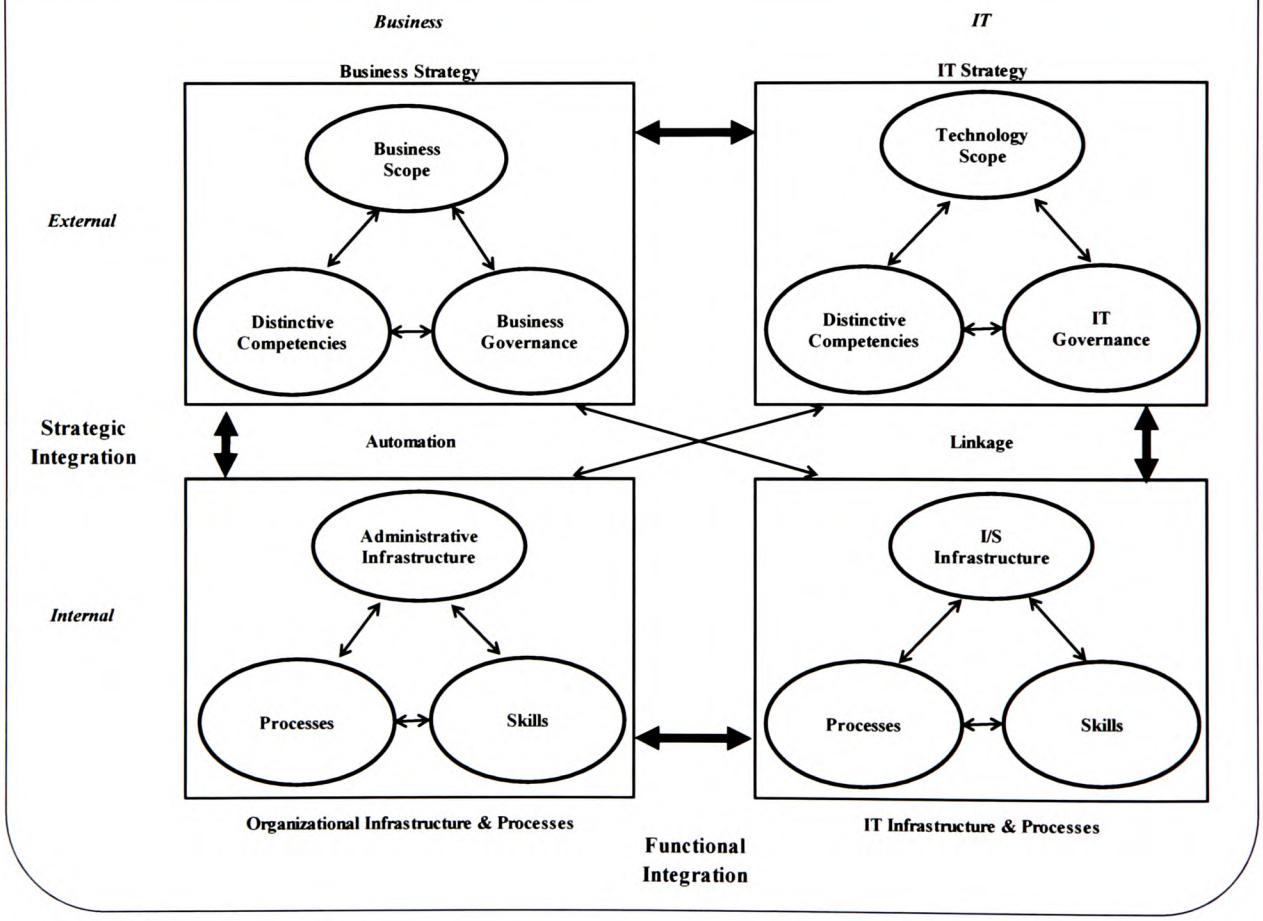
Figure 3-4 The Proposed Strategic Alignment Model (Henderson and Venkatraman, 1990)



The SAM, a framework from a study by Papp (1999), was based on this theoretical construct. Although the model was divided into the four quadrants the work indicated that interactions were not only between the dimensions adjacent but also across from each other on the diagonal (Figure 3.4). Avison et al. (2004) highlight that a SAM draws a distinction between the external perspective of IT (IT strategy) and the internal focus of IT (IT infrastructure and

process) thus implying two levels of integration: strategic integration between IT and the business strategy and; operational integration between the IT infrastructure and process and organizational internal infrastructure and processes. However, they add, there is minimal published research that attempts to validate SAM or describe its use in practice other than to conceptually understand (Figure 3-5) although they demonstrated that SAM had practical value based on applied data to the model from completed projects.

Figure 3-5 Strategic Alignment (adapted from Henderson and Venkatraman, 1989) (Avison et al., 2004)

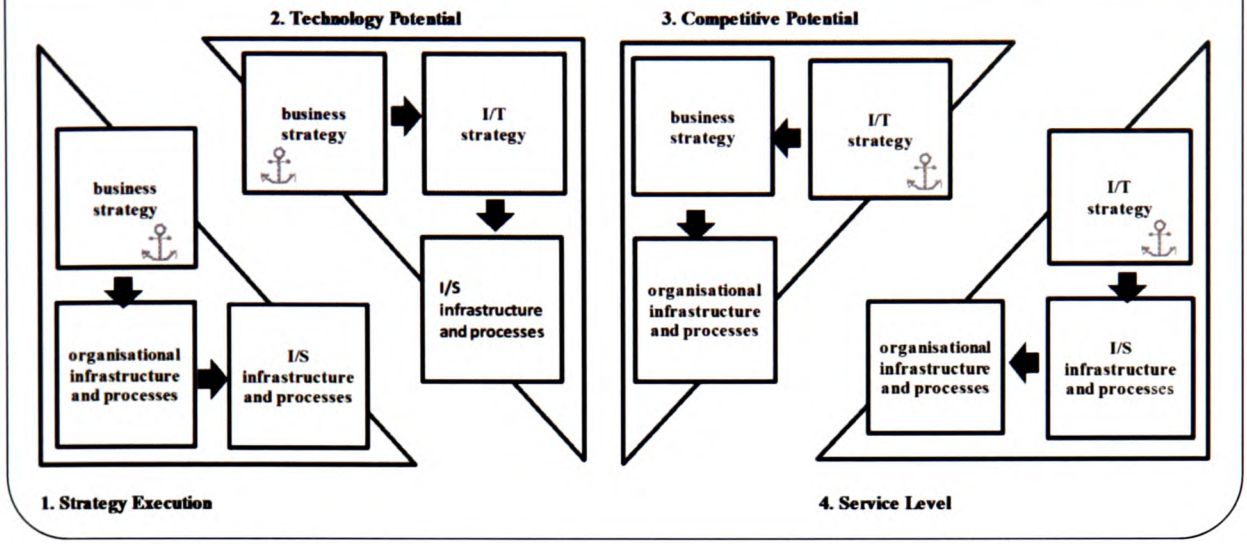


3.3.2 Luftman's elaboration and definitions

Luftman (1993) had aimed at transforming the model into a management tool by introducing four governing alignment perspectives. These perspectives are visualised by means of triangles drawn up by the anchor, pivot and impacted domain (see Figure 3.6); they induce approaches that are most appropriate to transform an enterprise in a given situation. In each

of these approaches, different methods, alternate roles for business and IT management and different performance criteria exist (Maes et al., 2000).

Figure 3-6 Luftmans's Four alignment perspectives (Maes et al., 2000)



Luftman et al. (1999) applied the SAM (Henderson and Venkatraman, 1990) throughout their five-year research project which surveyed data obtained from executives from over 500 firms covering 15 industries who had attended IBM's Advanced Business Institute. Within its components were several modifications which are shown below (Table 3-1). They draw attention to the relationships that exist among the 12 components of this model that define business and IT alignment.

Table 3-1 The Twelve Components of Alignment (Luftman, 1996)

I BUSINESS STRATEGY
1. Business Scope – Includes the markets, products, services, groups of customers/clients, and locations where an enterprise competes as well as the competitors, suppliers and potential competitors that affect the competitive business environment. 2. Distinctive Competencies – The critical success factors and core competencies that provide a firm with a potential competitive edge. This includes brand, research, manufacturing and product development, cost and pricing structure, and sales and distribution

channels.

3. Business Governance – How companies set the relationship between management stockholders and the board of directors. Also included are how the company is affected by government regulations, and how the firm manages its relationships and alliances with strategic partners.

II ORGANISATIONAL INFRASTRUCTURE AND PROCESSES

4. Administrative Structure – The way the firm organizes its businesses. Examples include central, de-central, matrix, horizontal, vertical, geographic, federal, and functional.
5. Processes - How the firm's business activities (the work performed by employees) operate or flow. Major issues include value added activities and process improvement.
6. Skills – H/R considerations such as how to hire/fire, motivate, train/educate, and culture.

III IT STRATEGY

7. Technology Scope - The important information applications and technologies.
8. Systemic Competencies - Those capabilities (e.g., access to information that is important to the creation/achievement of a company's strategies) that distinguishes the IT services. (Nb that Henderson and Venkatraman refer to Distinctive Competencies)
9. IT Governance - How the authority for resources, risk, and responsibility for IT is shared among business partners, IT management, and service providers. Project selection and prioritization issues are included here (See Section IV).

IV IT INFRASTRUCTURE AND PROCESSES

10. Architecture -The technology priorities, policies, and choices that allow applications, software, networks, hardware, and data management to be integrated into a cohesive platform. Nb that Henderson and Venkatraman refer to IS Infrastructure
11. Processes - Those practices and activities carried out to develop and maintain applications and manage IT infrastructure.
12. Skills - IT human resource considerations such as how to hire/fire, motivate, train/educate, and culture.

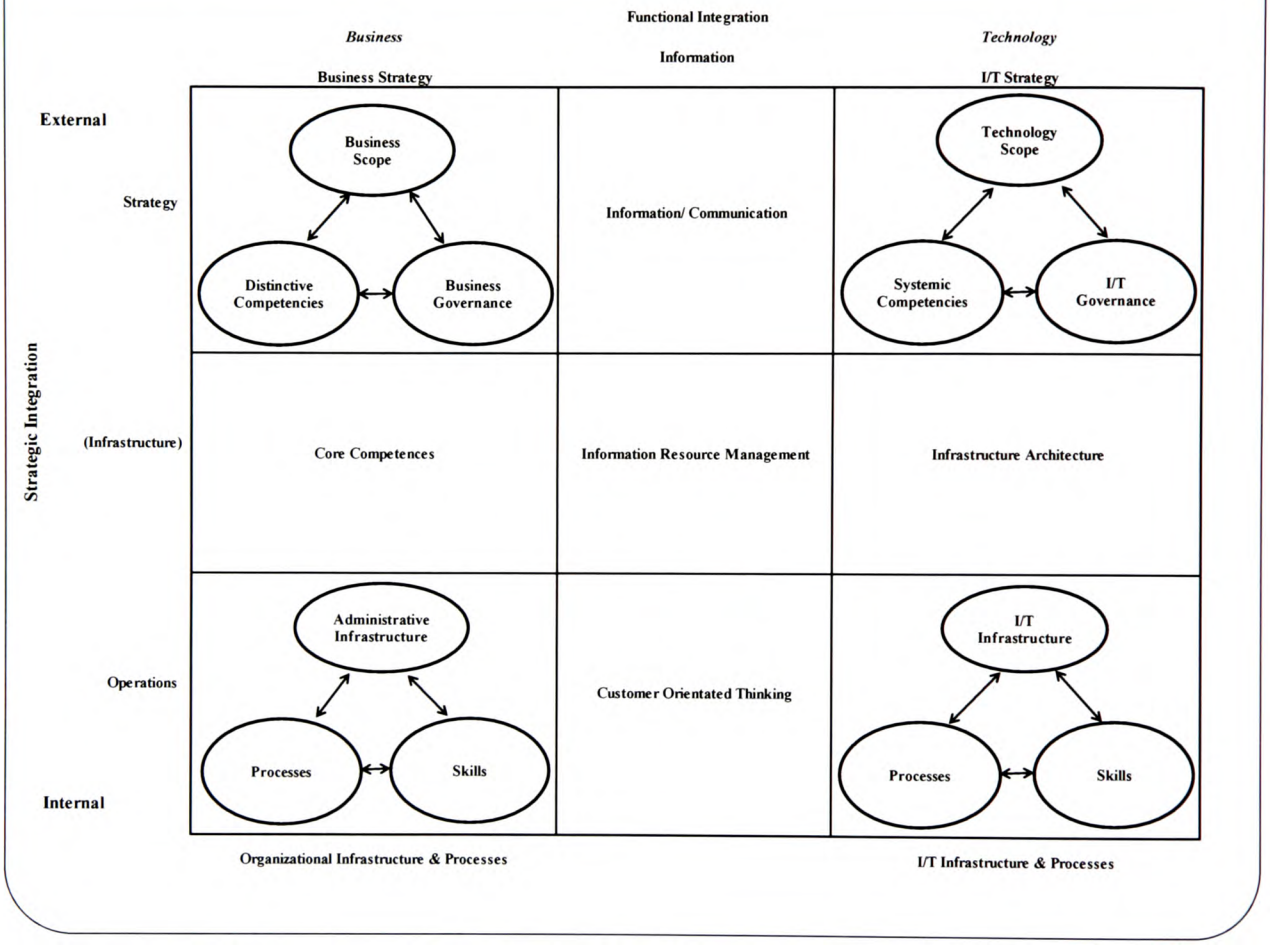
Prior to their research with IBM, Luftman et al. (1999) had further refined the SAM by elaborating on the critical management issues inside the domains. They had argued that the external strategy dimension is dealt with by: scope, defining the choice for (a) certain market segment(s); core competencies that contribute to the chosen strategy; and governance, the selection and use of inter-organisational relationships to obtain certain competencies. The internal dimension was concerned with issues regarding: work processes needed for operations; the acquisition, training and development of skills required to manage and operate the processes; an "administrative" business infrastructure / IT architecture (Maes et al., 2000). Papp (1999) agreed that alignment enabled a firm to maximize its investments and achieve harmony with its business strategies and plans, leading to greater profitability. In addition, noting that several frameworks had been proposed to assess the strategic issues regarding the role of IT as a competitive weapon the author stated that they served to define the two dimensions that comprise the alignment model. These included Fit, defined as the alignment of external and internal environments within an organisation, and Linkage, which was the alignment of the IT and business domains of an organisation (Venkatraman and Camillus, 1984, Venkatraman et al., 1993).

3.3.3 Further frameworks for alignment

Meas et al. (2000) noted that almost all later models and consulting practices in alignment started from the SAM (Henderson and Venkatraman, 1993) but highlighted the elaborations of interest which had been given attention in the literature (see Luftman, 1996). Their overall conclusion was that the original Henderson and Venkatraman model (1993), extended by both elaborations of Luftman (1993, 1996), was still the unchallenged model for business and IT alignment. Most research at that time was focussing on the underpinning of the positive impact of alignment on overall business performance. Maes et al. (2000) proposed a development of the overall framework based on an existing framework for information

management (IM) (Maes, 1999) and from the Integrated Architecture Framework (IAF) (Goedvolk, 1999). The generic framework (GF) (Figure 3.7) for IM (Maes, 1999) was an elaboration of the SAM previously described by Henderson and Venkatraman (1993).

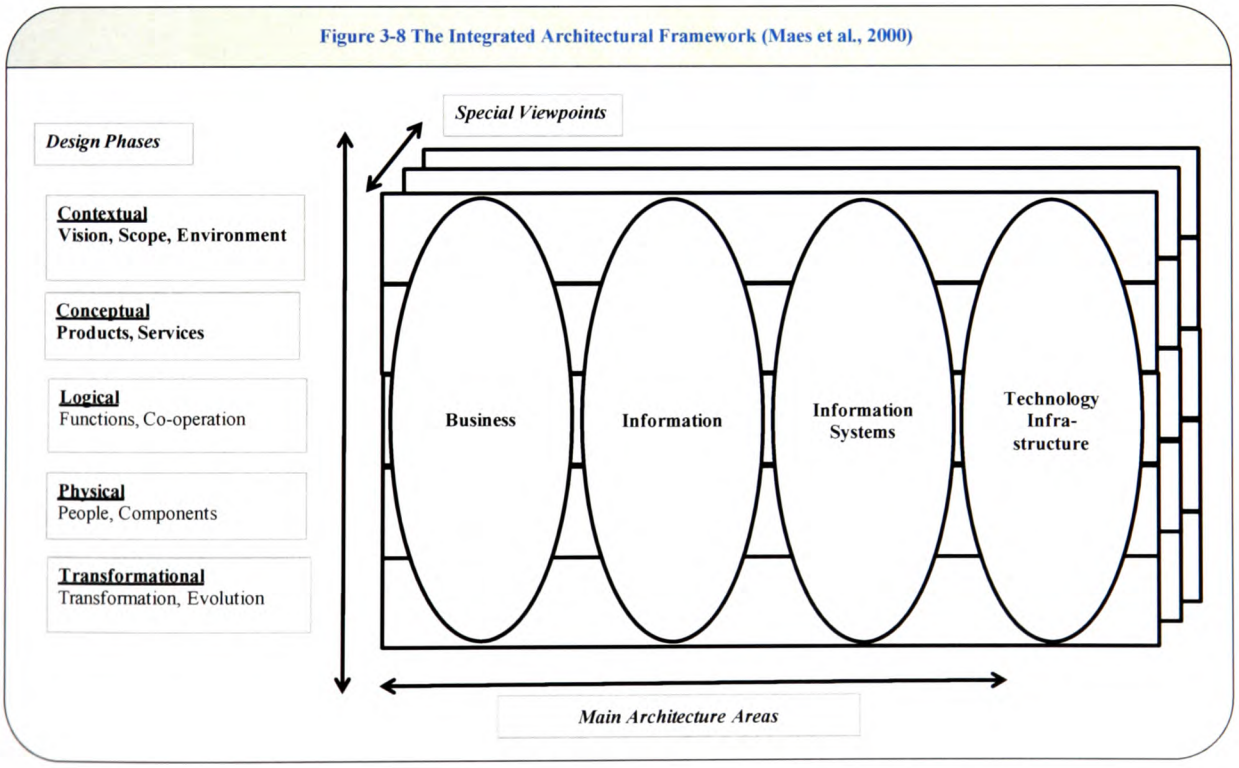
Figure 3-7 A generic framework for information management Maes (1999)



The GF addressed the concern surrounding the Henderson and Venkatraman (1993) model around dealing with choices regarding organisational and technological infrastructure and processes. By introducing new components, horizontal (structure) and vertical (information and communication), the author set out to emphasise that business and IT should be considered as independent variables in their own right in order to achieve successful alignment. This was based on the premise that the single internal domain cannot be easily split into a strategic and operational level. A central middle row is required to manage and design organisations and represent the structural components and variables e.g. competencies

and infrastructures of the organisation. Similarly, the assumption that the strategic level is predominant would ignore the complexity of cultural, political, financial aspects. At the crossroads of the newly introduced column and row is the architecture of the information/ communication/ knowledge infrastructure of modern organisations. Maes et al. (2000) conclude that this generic framework has proven to be a valuable frame of reference for the business and IT relationship. The IAF of Cap Gemini (Figure 3-8) described by Maes et al. (2000) aimed to support the integrated architectural design of business and IT. Using this framework commenced with the development of a business vision and IT vision of the new IT enabled enterprise. These visions are aligned through an integrated architectural design of the business and IT system based on the IAF. Subsequently, the architectural design is input for the business and IT transformation that results in a new IT enabled enterprise.

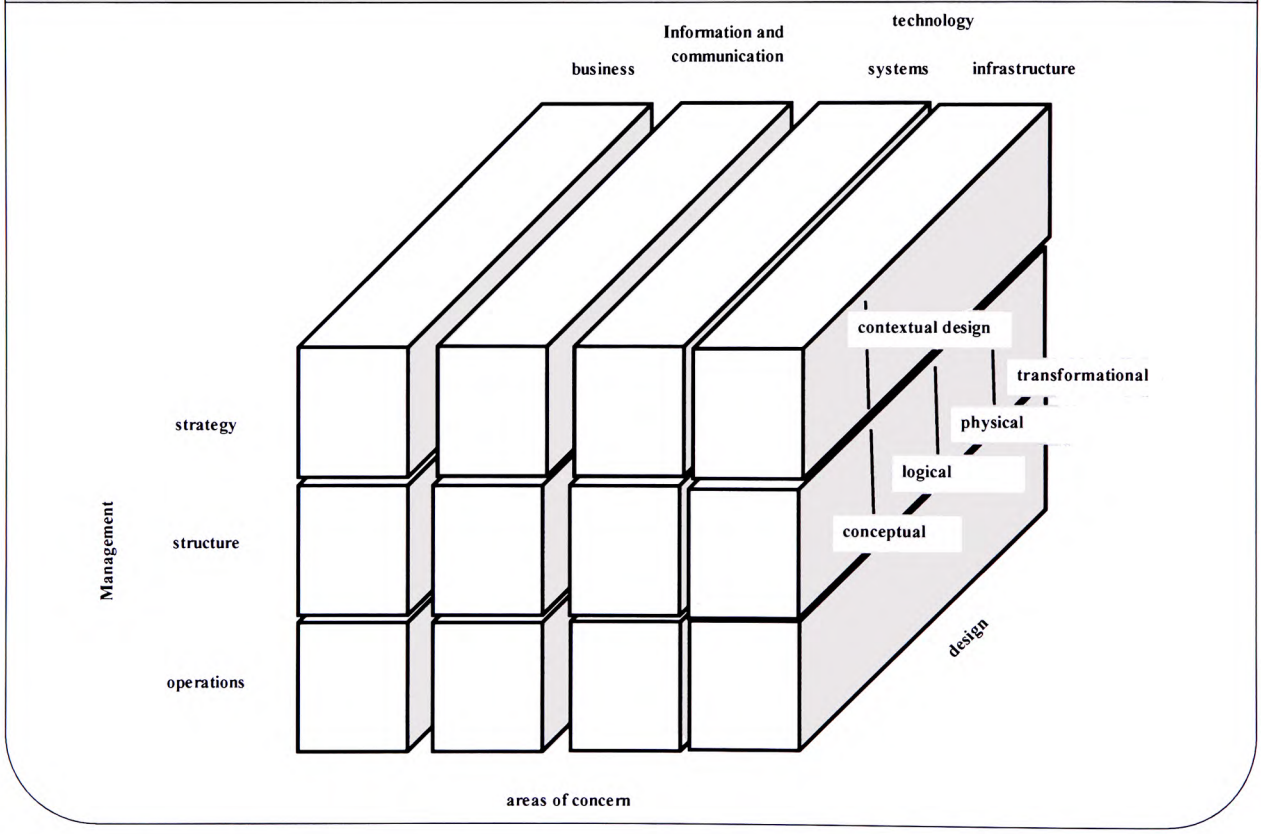
Figure 3-8 The Integrated Architectural Framework (Maes et al., 2000)



The horizontal dimension (architecture areas) concerns: Business Processes, Information provision system (including knowledge), (automated) IS and the technology infrastructure whilst the vertical dimension (design phases) supported by the architectural description are:

contextual, conceptual, logical, physical and transformational. Each design phase contains a part of the architectural description of the systems in the four architecture areas. A third dimension is comprised of specific architectural viewpoints that need a holistic approach concerning all main architecture areas e.g. security viewpoint. Following review, Maes et al. (2000) conclude that the two framework are largely complementary and provide a combination of both frameworks known as the unified framework (UF) for alignment (Figure 3.9).

Figure 3-9 An outline of a unified framework for alignment (Maes et al., 2000)



A revised UF refines the existing SAM to reflect the fact that IT and business strategies are moving closer together as technology evolves and becomes more integrated. They summarise their findings and provide a useful definition in that *"We define alignment as the continuous process, involving management and design sub-processes, of consciously and coherently interrelating all components of the business and IT relationship in order to contribute to the*

organisation's performance over time" (Maes et al., 2000, p. 19). Maes et al. (2000) highlight the divergence from previous definitions commencing with the need to opt for alignment as a dynamic process, involving continuous adjustment, and not as a static situation. They identified that it was necessary to take all the components of the business - IT relationship into account and not to confine alignment to the strategic level but to include intermediate information sharing components at all levels. Furthermore, they advocated not restricting alignment to managerial processes, but including design processes which thereby distanced from the vision in which the management is able to determine every single aspect of the business and IT relationship. Finally they warned not to strive "by definition" for harmony or balance between the different elements of the business - IT relationship, as this sustained lack of balance is the motor of many organisational innovations. In conclusion, they state that the main points of their paper were threefold: alignment is a combined management and design concern; the unified framework, the outline of which is derived in their paper, is a valid starting point for any further elaboration of the alignment concept; and the central issues of this unified framework, dealing with architectural and information sharing issues, are key to the success of this elaboration.

3.3.4 Issues emerging from alignment via conceptual models

Avison et al. (2004) highlights that Luftman (1996), Luftman (1997) and Papp (2001) do provide some practical application of strategic alignment yet fail to test the theories and methods in a practical manner in real life situations and organisations (Avison et al., 1999b, Avison et al., 1999a) and suggest that there is a need for a clearer framework, despite models being available (Henderson and Venkatramen, 1989, Ciborra, 1997) although no comprehensive model of the construct is commonly used. In addition, referencing the previous MIT work Hsiao and Ormerod (1998) attempted to categorise the main research areas according to three headings: *'Process re-engineering'* (described as management

processes in MIT) a focus on process improvement in order to increase operational efficiency (Davenport, 1993, Hammer and Champy, 1993). To obtain improvements the processes needed to change innovatively resulting in lead time, quality and cost reduction; *'IT-enabled transformation'* enables alignment (and resource allocation) of IT with the 'strategy' and 'structure' elements in the MIT framework; *'Human-centred renewal'* highlighted the impact of technology on the 'people' element in the MIT framework. This stemmed from the debate centred on behavioural change studies which had considered the human experience under the impact of IT. They concluded that there were five major weaknesses at that time in the theoretical positions. Firstly, partial viewpoints, each theoretical position takes a particular view of managing IT-enabled strategic change and tends to ignore other important changes. For example, Gould (1996) states that delivering strategy through cultural change neglects technology. Secondly, prescriptive solutions, the inclination to provide a set of packaged solutions derived from observation of exemplary firms. Although providing guidelines to manage change it fails to recognize the complex dynamics of change leading to managers attempting to adopt this fashionable approach which are inapplicable to their own situation. Thirdly, static frameworks, provided to illustrate the inter-relationship between the critical factors for the purpose of managing strategic change. Fourthly, linear models, use a production model (involving input, process and output) to understand how strategic change can be managed. Such a step-by-step model may explain the general sequence of a strategic initiative, but fails to account for the intertwining of complex change elements in every phase of planning, implementation, monitoring and evaluation. Finally, recommendations from practice, a summary of lessons derived from the analysis of 'successful' firms resulting in an inventory of effective practices, thus combining the most valuable individual practices to give the optimum overall solution (Hsiao and Ormerod, 1998).

3.4 Alignment via a systems approach

In chapter one, the concepts outlined by writers suggested that Business and ICT alignment could be viewed as a process of ICT alignment which in this section is translated to mean a system which can be reviewed holistically and bringing an opportunity to use levers from other knowledge domains to improve its outcomes. Every system must have a defined aim or goal and that helps identify the boundary. The system itself is a network of interdependent components that work together to try to accomplish the aim of the system (Leach, 2005). Therefore the theory and underlying foundations from other management domains could be developed to make a significant and original contribution to existing theoretical thinking and practice in the area of alignment.

3.4.1 Related system approaches

A number of related Quality Management (QM) disciplines overlap but agree on the fundamental values and principles to support generic systems with many having their roots within Deming's System of Profound Knowledge (SPK). Linderman et al. (2004) had summarised the fact that improving organisational performance has long been the goal of the QM field and quotes Taylor (1911) who suggested improvement occurred by standardizing workers' tasks and providing incentives; Shewhart (1939) who advanced the importance of understanding variation and the scientific method in performance improvement; and Taguchi (1986) who advocated the importance of product and process. The early founders were also influenced by the role of knowledge in improvement activities with both Shewhart (1939) and Deming (1993) making references to Lewis (1929), an American philosopher of epistemology. Shewhart (1939), whilst discussing a quality control process, outlined three steps which constitute a dynamic scientific process of acquiring knowledge which are: the specification of what is wanted; the production of things to satisfy the specification; and the inspection of the things produced to see if they satisfy the specification. These three steps

correspond to making a tentative hypothesis, carrying out an experiment, and testing the hypothesis. This results in knowledge being based on tentative hypotheses that are probable, which is similar to Lewis's (1929) notion of truth (Linderman et al., 2004). Deming was a management advisor to the Japanese during the American post-war reconstruction of their economy. He argued that western organizations and economies were in crisis because of their beliefs in flawed management assumptions (Zokaei et al., 2010). He described a theory of management focused on providing products and services which meet and exceed the needs of the customers of the organization. Although Deming is most associated with the emergence of Total Quality Management (TQM) it was later in life that he brought together the overall methods under a title of 'System of Profound Knowledge'. From his work and management thinking have emerged methodologies which can be deployed and used within the work environment and it is possible to identify the links to: System Thinking (ST) which is considered later in this chapter; Lean (Ohno, 1988, Womack et al., 1990); Theory of Constraints (TOC) (Goldratt and Cox, 2004); and Business Process Re-engineering (BPR) (Hammer and Champy, 1993). In a public sector context these approaches have been used by Radnor and Whalley (2008), Seddon (2008), Zokaei et al.(2010) in reviews and case studies and underpin a health service related business novel authored by Knight (2014).

3.4.2 Deming's Principles

In his seminal books Out of the Crisis (1986) and The New Economics for Business, Education, Government (1993) Deming produced a set of principles to guide action which although not a theory of knowledge (Linderman et al., 2004) became known as 'Deming's system of profound knowledge'(SPK) which he later described as a lens and map of theory to understand and optimize organisations (Leach, 2005). Hillmer and Karney (1997) state that as with any theory, Deming's philosophy can be viewed as predictions. For Deming (1993), management's vital role is to make decisions based on predictions, to make predictions based

on theory, and utilize theory based on knowledge. This core knowledge was described as profound knowledge. In addition, a more widely articulated view of his philosophy is embodied in Demings 14 Points which Hillmer and Karney (1997) state he was continuously revising with the version below (Table 3.2) being the one that which appeared in Neave (1990).

Table 3-2 Deming's 14 Points from Neave (1990). The Deming dimension. Knoxville, TN: SPC Press Inc.

D1: Create constancy of purpose for continual improvement of products and service, allocating resources to provide for long-range needs rather than only short-term profitability, with a plan to become competitive, to stay in business, and to provide jobs.
D2: Adopt the new philosophy. We are in a new economic age, created by Japan. We can no longer live with commonly-accepted levels of delays, mistakes, defective materials, and defective workmanship. Transformation of Western management style is necessary to halt the continued decline of industry.
D3: Eliminate the need for mass inspection as a way to achieve quality by building quality into the product in the first place. Require statistical evidence of built-in quality in both manufacturing and purchasing functions.
D4: End the practice of awarding business solely on the basis of price tag. Instead, require meaningful measures of quality along with price. Reduce the number of suppliers for the same item by eliminating those that do not qualify with statistical evidence of quality. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust. The aim is to minimize total cost, not merely initial cost. Purchasing managers have a new job, and must learn it.
D5: Improve constantly and forever every process for planning, production, and service. Search continually for problems in order to improve every activity in the company, to improve quality and productivity, and thus to constantly decrease costs. It is management's job to work continually on the system (design, incoming materials, maintenance, improvement of machines, supervision, training. retraining).
D6: Institute modern methods of training on the job for all, including management, to make better use of every employee. New skills are required to keep up with changes in materials, methods, product design, machinery, techniques, and service.
D7: Adopt and institute leadership aimed at helping people to do a better

job. The responsibility of managers and supervisors must be changed from sheer numbers to quality. Improvement of quality will automatically improve productivity. Management must ensure that immediate action is taken on reports of inherited defects, maintenance requirements, poor tools, fuzzy operational definitions, and other conditions detrimental to quality.

D8: Encourage effective two-way communication and other means to drive out fear throughout the organization so that everybody may work effectively and more productively for the company.

D9: Break down barriers between departments and staff areas. People in different areas, such as Research, Design, Sales, Administration, and Production, must work in teams to tackle problems that may be encountered with products or service.

D10: Eliminate the use of slogans, posters, and exhortations for the work-force, demanding Zero Defects and new levels of productivity, without providing methods. Such exhortations only create adversarial relationships; the bulk of the causes of low quality and low productivity belong to the system, and thus lie beyond the power of the work-force.

D11: Eliminate work standards that prescribe quotas for the workforce and numerical goals for people in management. Substitute aid and helpful leadership in order to achieve continual improvement of quality and productivity.

D12: Remove the barriers that rob hourly workers, and people in management, of their right to pride of workmanship. This implies, inter alia, abolishment of the annual merit rating (appraisal of performance) and of Management by Objective. Again, responsibility of managers, supervisors, foremen must be changed from sheer numbers to quality.

D13: Institute a vigorous program of education, and encourage self-improvement for everyone. What an organization needs is not just good people, it needs people that are improving with education. Advances in competitive position will have their roots in knowledge.

D14: Clearly define top management's permanent commitment to ever-improving quality and productivity, and their obligation to implement of all these principles. Indeed, it is not enough that top management commit themselves for life to quality and productivity. They must know what it is that they are committed to - i.e. what they must do. Create a structure in top management that will push every day on the preceding 13 points, and take action in order to accomplish the transformation. Support is not enough: action is required.

Deming's SPK, through which all management theories are accessible, identified four segments for discussion, but emphasized that they could not be separated, and were:

Appreciation for (knowledge of) a system; knowledge about (of) variation; Theory of knowledge; and (knowledge of) psychology (Leach, 2005) and these elements are relevant to the more current views put forward on ST by Seddon (Seddon, 2002, 2003, 2005, 2008, Seddon and Caulkin, 2007, Seddon and O'Donovan, 2010a, 2010b) and Zokaei et al (2010).

3.4.3 System Thinking

There are organizations who specialize in the translation of significant performance improvement ideas into service organizations (Seddon, 2002, Ahlstrom, 2004) and the use of ST in such situations has been considered and reported on by Seddon (2005) and Zokaei et al. (2010). ST was a key method upon which the planned future transformation activities within NHS Wales were to be based being outlined within chapter two.

3.4.4 System Thinking – A Brief History

Zokaei et al. (2010) provide a comprehensive summary of the development of ST which until the middle of 20th century used a dominant method of scientific inquiry which considered an organised system and reduced it into separate elements and then to study each component individually. Underpinning this approach (Zokaei et al. call it 'reductionist') was a general understanding that the whole is no more than the total sum of its parts. An improved understanding emerged amongst scientists during the 30's and 40's (von Bertalanffy, 1940, 1950, Wiener, 1948) and philosophers (Fries, 1936) that a system required holistic study further than the individual constituents of the system but also their inter-linkages and the relationships with the wider system. This systematic approach identifies additional characteristics which are not attributable to any particular part of the system leading to the conclusion that the system is more than just the total sum of its parts (Zokaei et al., 2010). The scientist von Bertalanffy (1972) defined systems thinking as the scientific exploration of 'wholes' and 'wholeness' whilst Flood (1999) stated that it was only possible to meaningfully understand ourselves by contemplating the whole of which we are an integral part. Moving

from the sciences systems theorists extended their organismic metaphor to include social and human-made entities with the result that systems thinking spread into disciplines such as general management (Deming, 1986, Ackoff, 1971), logistics (Forrester, 1958), cybernetics (Wiener, 1948), and most recently in the service industry (Seddon, 2005). This draws on influential thinkers such as Deming (1986) and Ohno (1988) in manufacturing and Seddon (2005) and the Office of the Deputy Prime Minister (ODPM) (2005) within service industries and the public sector.

3.4.5 Underlying Framework and key concepts

Seddon (2005) proposes an ST approach which is more akin to hard systems methods where the system is assumed to be identified with a single unifying purpose and previous research has suggested that some of this approach has found success in the UK Public Sector (Office of the Deputy Prime Minister, 2005, AdviceUK, 2008). Seddon (2005) further highlights the difference between the two approaches to management and the design of work in that conventional approaches (which he terms command and control) ensure fragments of an organization are optimized with minimal reference to the wider organization; and a systems approach which focuses on the interrelationship between the various parts of the organization. Command and control is defined as "*regulation by management, with its battery of computer and other informational aids*" (Seddon and Caulkin, 2007, p. 12) and "*where decision-making is distant from the work and based on abstracted measures, budgets and plans*" (Seddon and Caulkin, 2007, p. 14). Therefore, systems thinking emphasizes not just 'wholeness', but also the 'thinking of the system'(Figure 3-10) (i.e. that of the managers and workers within a system) which needs to change in order for the system to be able to improve and was very close to the philosophies of Deming and Ohno previously discussed. Table 3.3 from Seddon (2005) highlights the differences of the two approaches.

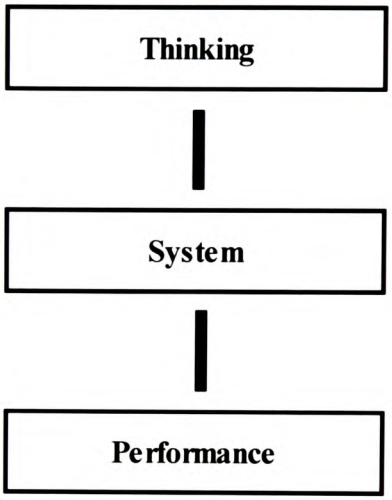
Table 3-3 Command-and-Control vs. Systems Thinking (Seddon, 2005)

Command-and-Control thinking		**Systems Thinking**
Top-down	*Perspective*	Outside-in
Functional specialisation	*Design*	Demand, value and flow
Separated from work	*Decision-making*	Integrated with work
Budget, targets, standards, activity and productivity	*Measurement*	Designed against purpose, demonstrate variation
Extrinsic	*Motivation*	Intrinsic
Manage budgets and the people	*Management ethic*	Act on the system
Contractual	*Attitude to customers*	What matters...?
Contractual	*Attitude to suppliers*	Partnering and co-operation
Change by project/initiative	*Approach to change*	Adaptive, integral

In their case studies, Zokaei et al. (2010) report on the method developed for applying systems thinking in public sector transactional services. This follows the previously described application of ST and Deming in all three cases following a 'check-plan-do' cycle (adapted from the Plan-do-check-act cycle). They highlight the importance of the 'check' phase (provides a framework for obtaining understanding and knowledge about the system) which opens up to the organization the effect of the 'command-and-control' principles and philosophy which are underpinning the design of the current system. These command and control principles are in fact the reasons for sub-optimal performance of this system and the

general approach and thinking needs to be changed before acting on the system and improving the performance.

Figure 3-10 The relationship between the thinking of management, the system and its performance (Seddon 2005)



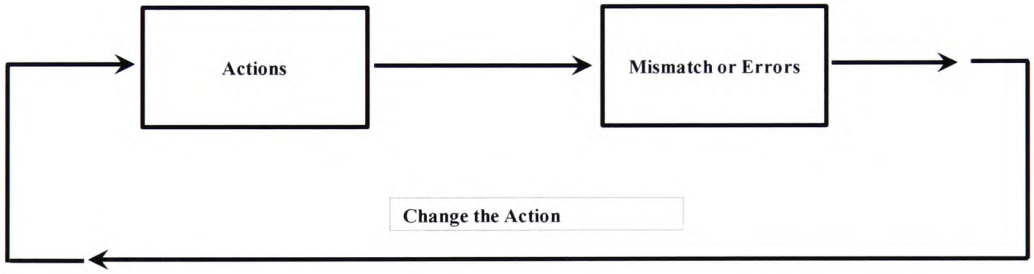
In the conclusion of their report, Zokaei et al. (2010) stated that there are four themes which emerge from their analysis: how ST provides a framework for change; the impact of current targets and measures; wider system implications; and sustainability of improvements. These are further described below.

3.4.6 How systems thinking provides a framework for change

Zokaei et al. (2010) noted that a key feature of the ST approach studied in their report was the emphasis on effectiveness thinking rather than efficiency thinking. This led the studies to concentrating on the delivery against the central purpose of a system through a redesign of the system in accordance with systems principles.' As a difference to other change methodologies was an absence of toolkits or training courses to attend with participants following a method which ensured they were engaged in the study of their service in a systematic way. A key element of system thinking is the need to study the demand in a

conscientious way which, they suggest, is longer than usual and ensures the participants are familiar with the customers and demands. This promulgates the approach of workers themselves being responsible for the redesign of the system in which they worked ensuring the engagement of the workers. Zokaei et al. (2010, p. 57) refers to Argyris and Schön's (1974) theory of double-loop learning. Argyris (1999) explained that single-loop learning occurs when matches are created, or when mismatches are corrected by changing actions. Double-loop learning occurs when mismatches are corrected by first examining and altering the governing variables and then the actions". This is highlighted in Figure 3.11 and 3.12 below.

Figure 3-11 Single Loop

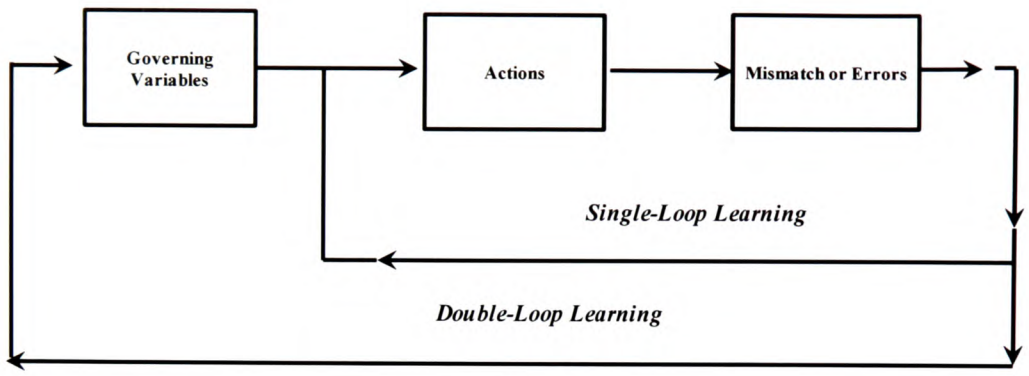


Single-Loop Learning

Source: (Argyris, 1990, p. 94)

Single-loop learning involves improving incrementally through learning new skills and capabilities, doing something better without challenging the underlying beliefs and assumptions (Argyris and Schön, 1974).

Figure 3-12 Double Loop



Source: (Argyris, 1990, p. 94)

Double-loop learning changes the governing variables, described as settings, of a program of work which causes ripples of change to fan out over the whole system (Argyris and Schön, 1974) and goes further than single-loop learning by reshaping the patterns of thinking and behaviour which govern why actions are taken. Seddon (2005) described this as a need to 'unlearn' before one can 'learn' and by recognising that there is a system of interactions underpinning actions can make change which is itself making the process open and self-aware (Zokaei et al., 2010).

"Systems thinking is only truly learned by doing, by action learning: it is only by doing that managers can unlearn, can find out for themselves where their current beliefs about the design and management of work are flawed, in order to put into place something that works systematically better, and can systemically be further improved" (Seddon and Caulkin, 2007,p. 15*).* This therefore embraces the concept of an emergent approach to change.

3.4.7 The Impact of Current Targets and Measures

The 'Check' process identified in each of the cases presented by Zokaei et al. (2010) demonstrated that the current measures and targets, as system conditions, were driving the wrong behaviours. The unintended consequences of managing by targets were causing poorer service to local residents in the form of longer end-to-end times and unnecessary extra work for the local authorities. Therefore targets were preventing staff from being able to act in response to what mattered to the customer/resident and disrupted the flow of work. Zokaei et al. (2010) also reference the impact of targets and measures in the public sector which if imposed arbitrarily can create a de facto purpose (i.e. meeting the targets) and initiate gaming to achieve them. Gaming is where actions are taken which enable targets to be met technically but not in substance. Some bad practice examples have been exposed to the practitioner such as meeting a target for offering a first appointment date within a specified number of weeks of referral which were achieved by offering dates to patients that they wouldn't be able to attend but technically they had received an offer. More evidence around numerous unintended consequences of centrally set targets and their limitations are recorded (Bevan and Hood, 2006) with one of the most publically visible example being the 'Tony Blair moment' where he was confronted by a voter two days before the election concerning the government target for doctor appointments (Seddon, 2008). By specifying how services should be run against standardized models, the ability of local service providers to innovate and continually improve could be removed (i.e. 'dumbed-down' standardisation).

3.4.8 Wider System Implications

The cases studied (Zokaei et al., 2010) revealed that by redesigning their systems, the authorities were able to realise that the boundaries of the systems which they were operating stretched further than the domain in which their service had control. Seddon (2008) describes

this in other case studies citing the benefits system impacting on Local Councils and Tax systems.

3.4.9 Sustainability of Improvements

In a case study cited by Zokaei et al. (2010) a certain degree of sustainability was evidenced due to the principles being embedded across all of the services. This supports other literature such as Jackson (2003) who suggested that long term sustainable change cannot be achieved on the basis of remote expert diagnosis by consultants and recommendations endorsed only by higher management and highlighted that participation at all levels is essential. It was noted that the involvement of both the frontline staff and managers in analysis and redesign improvements avoided 'dumbed-down systemisation'. This was previously referred to as the principle of Jidoka.

3.4.10 Systems Thinking in the Public Sector

Zokaei et al. identified the beginning of the application of systems thinking in the UK public sector around the introduction of the Soft Systems Methodology (SSM) by Checkland (1990). Checkland made a distinction between hard systems characterised by clearly defined processes and structures, which can be readily quantified, and soft systems that are ill-defined, fuzzy and difficult to quantify. The definition of hard systems often applies to man-made and physical systems whereas soft systems largely concern human and social activities. He proposed the methodology as a way of building human activity systems with which debate can be aimed. This clarifies what people regard as truly relevant for required real action. As a result barriers are broken down, people understand the whole picture, benefits derived further down the process are identified and participants become part of the solution as champions to the change (Checkland, 1990). SSM therefore assumes a diverse number of customers and a multitude of purposes for the system and applies action learning methods to find the optimal solutions. Zokaei et al. quote no evidence of a wide acceptance of SSM

within the UK public sector beyond a number of isolated applications (Checkland and Holwell, 1998). One criticism levied at SSM was the fact that it supported the status quo by default rather than taking radical action on the system. Seddon and O'Donovan (2010b) state that there is a need to comprehend transactional service organizations as systems in the same way as Deming quoted. They raise issues with the current management style in the fact that all demand received by the system is not 'production'. Outlining previous studies they suggest that there are two types of demand which enter a system – value demand (where customers/clients place demands on an organisation that is wanted i.e. business exists to serve that demand) and failure demand (which is caused by a failure to do something right for a customer (Seddon, 2003). Examples of this latter demand include customers call back, turn up again, create more demand and hence enable less work to be successfully completed. This could be described in Deming's language as a form of sub-optimisation and in Ohno's language as a type of waste. The purpose of TPS was to identify waste in the system and consistently and thoroughly eliminate it completely to increase production efficiency (Ohno, 1988). Seddon and O'Donovan (2010b) suggest that failure demand is a systematic phenomenon peculiar to service organisations, is not among the seven types of waste promoted by lean tools literature, and forms the largest waste in transactional service systems when managed according to present style. They highlight that given the economic leverage its removal provides, it is a poignant illustration of the general argument against 'lean' as tools where starting an intervention with tools ignores the priority to know first your problem(s). They warn that treating failure demand as though it is just more work to be done is to miss seeing this powerful economic lever (Seddon and O'Donovan, 2010b). A transactional service system's purpose is to be able to absorb the variety of customer demand and by understanding value demands from the customers or clients point of view management's attention can be drawn to the advantage of designing the organization to absorb such variety.

Again referring to the misuse of tools they continue that understanding the problem leads to tools (or methods) with which to solve it (Seddon and O'Donovan, 2010b). Again using Deming's language they conclude that predictable failure demand is preventable, a 'common cause' in a system, and thereby points management's attention to services that need to be re-designed. One of the greatest reasons for transactional service systems failing to absorb variety is standardization. Citing examples from studies at the HRMC (and the Department for Work and Pensions (DWP) (Seddon, 2008)) and Advice UK (2008) they suggest that standardisation, in traditional service organizations, can often drive costs up rather than managing costs. Standardisation of work in service organisations is typically determined by hierarchy (top down convention) and/or experts who impose it upon workers which they say is a common feature of tools-based interventions. Acknowledging Ohno (1988), who stated that before you can improve you must standardize, Seddon and O'Donovan (2010b) point out that this is not manufacturing and would diminish the system's ability to absorb variety and highlight that Ohno placed importance on workers writing their standards themselves rather than ones forced down from above. This was a feature of TPS that improvements were made by workers adhering to a scientific method, an essential component in organizational learning (Spear and Bowen, 1999) and some writers (Womack et al., 2007) seemed to the authors to miss this emphasis and placed responsibility for standardization with management: 'The work process itself, along with the management process, must be absolutely standardized by managers, and by manufacturing and industrial engineers as well, before a work team can have any hope of improving it. Standardisation in this context means creating a precise and commonly understood way to conduct every essential step in the process' (Womack et al., 2007 , p. 290). Seddon and O'Donovan (2010b) paint a vivid picture of the deleterious effect in service organizations of employing lean tools resulting in work which has typically been standardized and industrialized from an internal, cost-focussed perspective.

Deming (1986) posited, this is to focus on the wrong things and from his experience most troubles and most possibilities for improvement add up to proportions where 94 per cent belong to the system (responsibility of management) and 6 per cent are special. As previously stated he encouraged managers to study variation and its causes. Seddon and O'Donovan (2010b) provide examples of variation aspects that could make the duration of calls in a call centre longer or shorter which could be potential causes of variation in a call centre worker's performance. These included the nature of the call; the type of customer; whether processes have been designed from a customers' point of view (and as managers rarely study demand, that is unlikely). Other factors were whether the IT system works today; whether people in other departments have told customers things they did not tell people in the call centre; or the knowledge of the worker and so on.

3.4.11 Issues emerging from alignment via system thinking

System thinking introduces a systems approach which focuses on the interrelationship between the various parts of the organization rather than conventional methods which ensure fragments are optimised with minimal reference to the wider organization, termed command and control by Seddon (2005). The authors warn of the dangers of running services against standardized models resulting in the removal of the ability of local service providers to innovate and continually improve. This has interesting parallels with the approach of the national ICT programme introduced in chapter 2.18. Zokaei et al. (2010) also notes the emphasis on effectiveness thinking rather than efficiency thinking; an absence of toolkits or training courses; the need to study the demand in a conscientious way; and for participants to become familiar with the customers and demands. Systems thinking is only truly learned by doing (Seddon and Caulkin, 2007) and embraces the concept of an emergent approach to change. The need to study demand in greater detail than normal and be familiar with the customers and demands lends itself to workers themselves being responsible for the redesign

of the system in which they worked ensuring the engagement of the workers. Jackson (2003) states that long term sustainable change cannot be achieved on the basis of remote expert diagnosis by consultants and recommendations endorsed only by higher management. Participation at all levels is essential and Checkland (1990) adds that people need to understand the whole picture, benefits derived further down the process are identified and participants become part of the solution as champions to the change. All demand received by the system is not 'production' and two types enter a system – value demand (where customers/clients place demands on an organisation that is wanted i.e. business exists to serve that demand) and failure demand (which is caused by a failure to do something right for a customer (Seddon, 2003). Failure demand is a systematic phenomenon peculiar to service organisations. A transactional service system's purpose is to be able to absorb the variety of customer demand and by understanding value demands from the customers or clients point of view management's attention can be drawn to the advantage of designing the organization to absorb such variety with the greatest reason for transactional service systems failing to absorb variety is standardization. Standardisation of work in service organisations is typically determined by hierarchy (top down convention) and/or experts who impose it upon workers.

3.5 Alignment via a Method or Methodology

3.5.1 Introduction to Implementation Methodologies

This section considers the available methodologies which can be employed to facilitate alignment and are drawn from the literature as well as more commonly used practical solutions such as projects. In all cases, the approaches will need to be interact with the components outlined in the conceptual modelling section and can be viewed to a lesser or greater extent as microcosms of an organisation.

3.5.2 ALIGN

As a means of improving performance and profitability Papp offers a methodology to achieve alignment. Using the mnemonic ``ALIGN" the steps outlined are to: assessing the firm's perspective using the alignment model; learning to recognize and leverage IT within your firm to maximize efficiency; incorporating financial measurements suitable for your particular industry when assessing alignment; giving everyone in the firm a clear and useful role to facilitate synergy between IT and the business; and never stopping the assessment of alignment within the firm. It is a continuous, dynamic process requiring constant monitoring (Papp, 1999).

3.5.3 Alignment perspective

The alignment perspective emanated from research by Avison et al. (2004) to provide a gap analysis and measurement focus, which centred upon identifying whether the IT strategic direction meets with the business direction. One purpose of their research was to identify or develop a practical framework for managers in general, though it is likely to be used by technology managers, to help them to identify the current level of alignment with the business and also to control future alignment. On completion of a domain analysis, management should be able to determine their understanding of the firm and its alignment, i.e. they should have the following: A completed document that details the position across the firm, in terms of business, information, IS and technology, from a strategic, structural and operational perspective. This indicates an effective understanding of the firm, and its interrelationships and interdependencies or an incomplete document with gaps in some of the domains, indicating a poor knowledge and/or understanding of the firm, and its interrelationships and interdependencies. If a complete analysis has been performed, management will have sufficient information to allow a graphical interpretation of the firm's position from a strategic, structural and operational perspective. This, in turn, will identify the

type and degree of alignment. This research identifies processes that enables a manager, or management team, to determine the alignment perspective taken by their firm and enable them to change the perspective to ensure the IT strategic direction is aligned with the business strategic direction, through the re-allocation of project resources.

3.5.4 IT Alignment Roadmaps

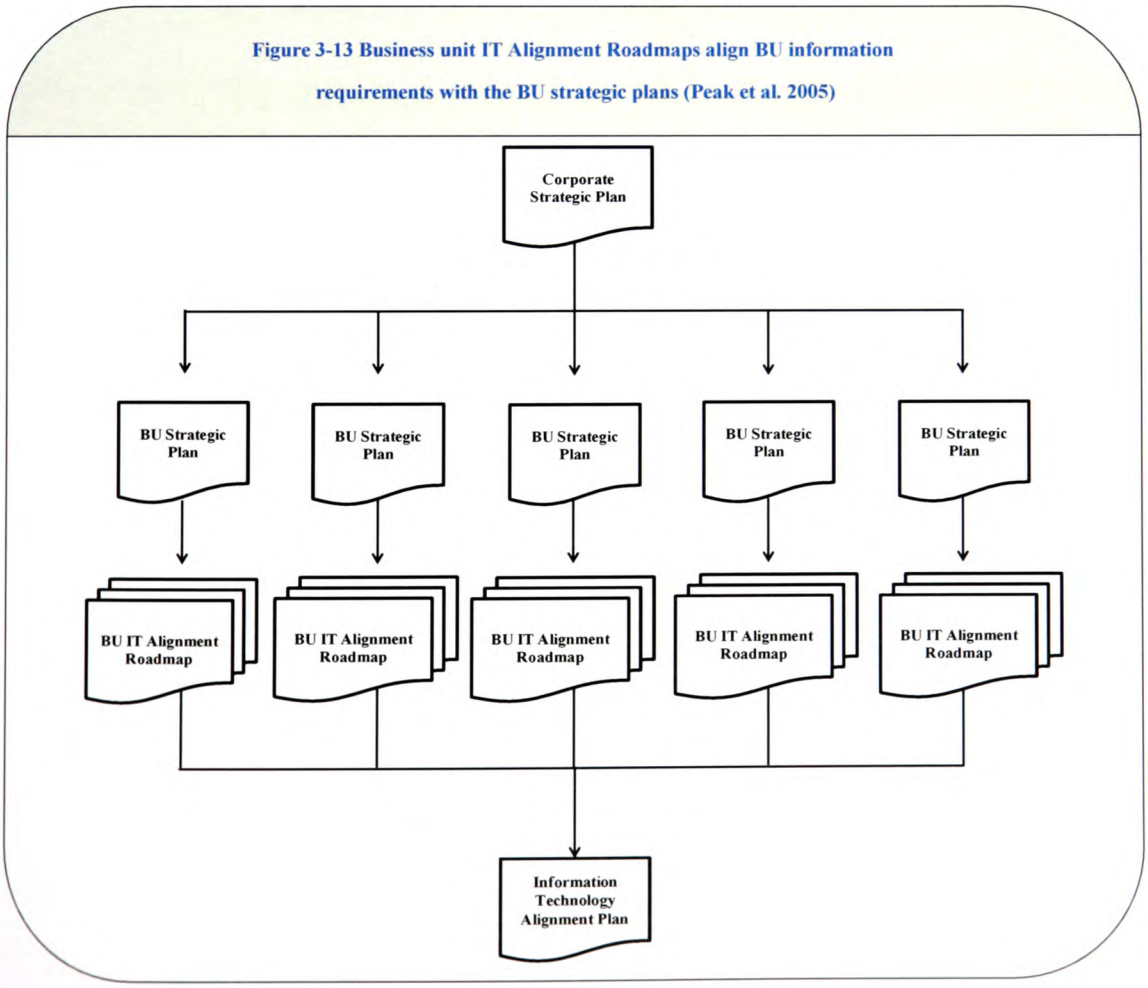
Technology road-mapping can be used for strategic, programme and integration planning. There are many types of roadmaps, but the most common format comprises a graphical framework that shows how technology and product developments align with business and market goals, as a function of time (Phaal et al., 2006). Its use sets out to describe the market within which an organisation operates; the plan for products and process development; establishes technological capabilities; and analyzes resources thereby revealing the interrelations among market, product and technology parameters. As a result, it identifies objectives that justify company efforts (Oliveira and Rozenfeld, 2010). The technology roadmap provides a framework within which the integrated business strategy can be charted, incorporating all key perspectives (market, business, product, service, technology, resources, etc.). However, the roadmap itself does not include any inherent decision-making elements, and so must be supported by an appropriate process and set of tools to enable the roadmap architecture to be defined (in terms of sublayers within the roadmap), and still requires product attributes and technology solutions to be prioritised (Phaal et al., 2006).

3.5.5 IT Alignment Planning

A variant of this is IT Alignment Planning which assumes that organisations are built on mechanistic principles and that management uses structured, planning-oriented approaches to business objectives (Avison et al., 2004). The deliverable, the IT Alignment Plan that integrates the business unit Roadmaps, provides consistent, corporate-wide IT vision and status, and also functions as a capital budgeting tool for major IT resources, projects, and

systems. This becomes a high-level IT planning product customized for each corporate business unit (Peak et al., 2005). Major deliverables include: a management-level portfolio of important IT systems and products; a prioritized list of information solutions (e.g., systems, enhancements, strategies, projects, training programs) containing estimates of size, resources, new technologies, dependencies, cost benefit, and installation date; and a solution delivery schedule (Peak et al., 2005). The IT Alignment Plan reconciles and integrates the IT Alignment Roadmaps and provides: a consistent, comparative, prioritized view of new and current IT projects across the corporation that can be used for strategic planning and capital budgeting; and a consistent view of major information needs and concerns across the corporation. IT Alignment Planning creates links between the strategic and the operational levels of the corporation (Figure 3-13) (Peak et al., 2005).

Figure 3-13 Business unit IT Alignment Roadmaps align BU information requirements with the BU strategic plans (Peak et al. 2005)



3.5.6 Blueprints and Managing Successful Programmes (MSP)

Another well used approach is provided by a transformation method where a high level scope of what must be included and integrated is contained within an effective Blueprint. Blueprints are outlined in the Office of Government Commerce document Managing Successful Programmes (MSP) (Great Britain. Office of Government, 2007) where their use as a routemap are advocated and described as a model of the organisation, its working practices and processes, the information it requires and the technology that supports its operations. MSP recognises that organisations who can transform through effective leadership and strategic control are more likely to survive and prosper and the whole concept is based upon effective and efficient programme management practice to deliver transformational change drawn from experiences of both public and private sector organisations. This has at its core four components shaped around the acronym POTI (see Table 3-4).

Table 3.4 - MSP Blueprint Components

P	Processes, business models of operations and functions including changes to operational costs and performance levels
O	Organisational structure, staffing levels, roles, skills requirements and changes to organisational culture, style and personnel
T	Technology, IT Systems and tools, equipment, buildings, machinery, accommodation requirements
I	Information and data requirements, changes from existing to future state, including details of any new developments or redevelopments

In essence, it requires a description of the current and future states required to derive a benefit from the change with the gap analysis being the methodology deployed to identify what series of transformation need to take place usually in the form of projects. It encompasses transitional states (known as Tranches) where programmes are complex or take place over longer periods of time. The link with benefits enables options to be considered and using

iterations, optimisation of the approach. Its approach to the design and deliverables to be considered allows collaboration with other components.

3.5.7 Programme Management (PGM) and Project Management (PJM)

Srivannaboon and Milosevic (2006) state that (unlike R&D, production, human resources, IT which are viewed as functional strategies to support strategic priorities) PJM is rarely seen as a functional strategy, although projects are basic building blocks of organisational strategy in many companies. They cite work related to exploring alignment of PJM and the business strategy which included aspects of PJM Strategy (Anderson and Merna, 2003), PGM (Lycett et al., 2004), process for aligning PJM with business strategy (Srivannaboon and Milosevic, 2004), project business concept (Artto and Wikström, 2005, Hellstorm and Wiktrom, 2005), and strategic intention through multiple projects (Artto and Dietrich, 2004, Dietrich and Lehtonen, 2005). These writers suggest business strategies require different foci and contents of PJM elements. Therefore, it is important for organizations to realize their business strategies and identify appropriate PJM configurations that match their business strategies (Srivannaboon and Milosevic, 2006)). The following sets out a number of those potential configurations.

3.5.8 Programme (PGM)

The definition used within MSP (Great Britain. Office of Government, 2007) for programmes states that a programme is a temporary, flexible, organisation created to co-ordinate, direct and oversee the implementation of a set of related projects and activities in order to deliver outcomes and benefits related to the organisation's strategic objectives. During a programme life cycle projects are initiated, executed, and closed and a programme provides an umbrella under which these projects can be co-ordinated. The objective of the programme is to integrate the projects so that it can deliver an outcome greater than the sum of its parts. The Association for Project Management define PGM as the coordinated

management of related projects, which may include related business-as-usual activities, that together achieve a beneficial change of a strategic nature for an organisation (APM, 2006). This latter definition tends to view programmes as vehicles for bringing about complex change. Common features from the literature and guidance on programmes and programme management include importance of managing benefits, stakeholders, and ensuring governance. Another element stated is the shift from outputs or deliverables to outcomes or desired end states. Those involved in programmes need to appreciate strategic context and drivers, and to balance 'business as usual' with bringing about change. Programme interdependencies and factors that could affect, constrain, block or influence the outcome(s) need to be identified and addressed (Pellegrinelli, 2010). Pellegrinelli (2010) references the Project and Program Management for Enterprise Innovation (P2M), the foremost Japanese text on programme management, which says that programme and programme management is a 'practical capability' to respond to external changes, which allows flexibility and copes with ambiguity, complexity, uncertainty and expandability. He adds that some commentators attribute to programmes a broader role and meaning encompassing the initiation and shaping of projects (Pellegrinelli, 1997) and a process for the realisation of broader strategic or tactical benefits. Aritua et al. (2010) state that this concept aligns with recent arguments by Winter and Szczepanek (2008) that PGM is a value creation activity and by Pellegrinelli et al. (2007) that PGM in this sense is a vehicle for strategic change. In order to achieve their objectives, PGM functions inevitably involve a diversity of stakeholders and suppliers who influence the process and provide input to realizing the benefits (Llewellyn and Tappin, 2003). Aritua et al. (2010) also refer to the importance played by the PGM function in linking individual projects to the overall organisational strategy. They state that programme risks are mainly concerned with political issues, decisions about procurement routes and how to deal with the stakeholders and that this presents challenges which require a different mindset from

single project risks. This has implications and a need to take a holistic view of the project environment and its relation to the overall organizational context (Aritua et al., 2010). Much of the literature and most of the professional standards and guidance in PJM has remained rooted within a *''functionalist, instrumental paradigm and the extension of this paradigm to programme management has threatened to reduce this approach to an extension or variant of project management''* (Pellegrinelli, 2010,p. 7). Pellegrinelli (2010) advocates that a distinct PGM discipline have sought to distinguish it from PJM (Pellegrinelli, 1997, Pellegrinelli, 2002, Thiry, 2002, Thiry, 2004, Pellegrinelli and Partington, 2006, Pellegrinelli, 2008) although sceptics have questioned the uniqueness of features attributed to PGM, arguing that it reflects a narrow conception of PJM, disconnected from the lived experiences of competent practitioners.

3.5.9 Projects (PJM)

Underlying this PGM approach is, in most cases, an established network of organised and related projects. PJM have been described as a temporary organisation that is created for the purpose of delivering one or more business outputs according to a specified Business Case (Great Britain. Office of Government, 2007). It is largely a mechanistic process and works effectively within stable conditions being delivered within a clear scope which provides benefits. The cornerstones of the project parameters are focused around Time, Cost and Quality whereby changes to one component impact on the others. PJM is a specialized form of management, similar to other functional strategies, that is used to accomplish a series of business goals, strategies, and work tasks within a well-defined schedule and budget. (Srivannaboon and Milosevic, 2006). It is defined as a unique, transient endeavour undertaken to achieve a desired outcome (APM, 2006) and other writers have described them as powerful strategic weapons, initiated to create economic value and competitive advantage (Shenhar et al., 2001). They describe project success as a strategic management concept,

which should help align project efforts with the short- and long-term goals of the organization (Shenhar et al., 2001). Traditional tools and techniques, such as work breakdown structures (Haugan, 2002), networks, critical path method and cost and schedule tracking, largely drawn from operations research, have been augmented by topics such as procurement, team development, stakeholder management and project leadership (Pellegrinelli, 2010). Srivannaboon and Milosevic (2006) suggest that one reason the PJM and business strategy alignment has become the focal attention is that companies must develop and execute innovative business strategies in order to stay competitive. In doing so, projects are often chosen as vehicles to implement those strategies, and PJM is commonly considered to be an important business process. In such situations, companies must make sure that projects are executed fully in line with the strategies they support. The PJM and business strategy alignment helps organizations to focus on the right projects, given the objectives of the business strategy. Such alignments are challenging because the objectives of the business strategy are not always well-communicated or consistent with PJM actions. Misalignment may cause an organization to lose market opportunities, and recovery from such misalignment is difficult. Understanding these alignments may be one of the major challenges to effective PJM. There is minimal literature on aligning PJM and business strategy (Srivannaboon and Milosevic, 2006). Shenhar et al. (2001) suggest that project managers should act strategically, with their activities focused on business needs and on creating competitive advantage with winning products and that project success planning should become an integrated portion of organizations' strategic thinking and strategic management. They advocate that project success dimensions should be determined as part of the strategic goals of the organization, and prior to project initiation should be incorporated into the top-management decision making. According to Shenhar's (SPL) framework, Project Management elements that should be aligned with the business strategy can be identified as:

project strategy, organization, process, tools, metrics, and culture (Srivannaboon and Milosevic, 2006). Koskela and Howell (2002) argue that in recent years there has been particular interest in defining or redefining, a theory of PJM that can be used in more complex and uncertain project situations and that the underlying theory of project management is obsolete due to its inability to manage uncertainty and change. One of these is Agile Project Management (AGPM) which is based around agile and has been described as more of a thought process. The following practices are important: think in small incremental deliverables, customer commitment to the deliverable, continuous QA, and build the processes around acknowledged fluid requirements. At a more detailed level this includes: assume simplicity; embrace change; enable and focus on next effort; incrementally change; maximise value; manage with a purpose, question actions; rapid feedback to all stakeholders; quality deliverables; and create documentation based on value (Fernandez and Fernandez, 2008). Although first used within the software development domain agile techniques have been adopted within a project context as a useful way to deal with the aforementioned complex and uncertain situations.

3.5.10 Issues emerging from alignment via a Method or Methodology

In most cases, the approaches selected and reviewed in this section will need to interact with the components outlined in the conceptual modelling section. Whilst the methodologies are drawn from two sources including examples from the research domain (Papp, 1999, Avison et al., 2004) others emanate from practice. The review indicates potential for partial alignment in areas like road-mapping where technology and product developments align with business and market goals, as a function of time (Phaal et al., 2006) but have no inherent decision making whilst others like IT alignment are built upon mechanistic principles with structured planning-orientated approaches to business objectives (Avison et al., 2004). A wider alignment potential comes from the use of Blueprints in the form of a route-map as part

of MSP which is widely deployed. More generally, programme and projects are used by organizations to realize their business strategies but need to identify appropriate PJM configurations to match their business strategies (Srivannaboon and Milosevic, 2006). One differentiator with PGM is a 'practical capability' to respond to external changes, which allows flexibility and copes with ambiguity, complexity, uncertainty and expandability which in this sense is a vehicle for strategic change. Another importance played by the PGM function in linking individual projects to the overall organisational strategy (Aritua et al., 2010) although Pellegrinelli (2010) has warned against PGM being reduced to an extension or variant of PJM. PJM in itself is a mechanistic process and works effectively within stable conditions being delivered within a clear scope which delivers benefits and to counter this obsolescence when used in more complex and uncertain project situations has seen the use of AGPM. Projects are often chosen as vehicles to implement strategies, and PJM is commonly considered to be an important business process (Srivannaboon and Milosevic, 2006) with the PJM and business strategy alignment helping organizations to focus on the right projects, given the objectives of the business strategy.

3.6 Alignment via Critical Success Factor

3.6.1 Introduction to Implementation Methodologies

This section considers the available critical success factors which can be identified as key to facilitating alignment drawn from the literature. In all cases, the approaches will need to be viewed with the components outlined in the conceptual modelling section.

3.6.2 Introduction to Enablers and Inhibitors

As stated in chapter two Luftman (1996), Burn (1997), Yetton (1997), and Hsaio and Ormerod (1998) provide some examples of enablers and inhibitors of alignment, and the shortfalls in the literature on: how to achieve alignment between business and IT strategies;

the impacts misalignment might have on a firm; and what management can do to diagnose, achieve and maintain alignment (Luftman, 1996, Papp and Motiwalla, 1996). Reich and Benbasat (2000) demonstrate that five elements contribute to short-term alignment. These are: shared domain knowledge between the IT department and the business domain; IT implementation success; communications; planning connections between IT and the business; and business direction.

3.6.3 Enablers and Inhibitors to Alignment

Luftman's research has, since the early 1990's, identified trends and established an alignment benchmark for enablers and inhibitors based on survey work from the initial IBM Advanced Business Institute from 1993 to 1997 and supplemented by the SIM surveys in 2003, 2005 and 2007. As Luftman et al. (2006) conclude, addressing enablers and inhibitors is not a simplistic, one answer solution, it is complex and ongoing whilst other writers draw attention to them being only a partial aid to practitioners (King and Burgess, 2006). The questions have been consistent since 1993 with the aim to analyze whether the enablers and inhibitors have changed over time. The summary tables have been reproduced in Table 3-5 Enablers and Table 3-6 Inhibitors and show the progression through the 1993-1997, 2003, 2005 and 2007 surveys. In terms of the survey, a high ranking in the list of enablers means the factor 'greatly enables' (fosters) alignment whilst a high ranking in the list of inhibitors means the factor 'greatly inhibits' (is a roadblock to) alignment (Luftman et al., 2006). The top five enablers demonstrated a consistence across all the surveys although the rankings had minor differences (Luftman and Kempaiah, 2008). Initially, the top inhibitors displayed a consistence over time although the rankings were different in 2005 than in 2003 and 1993-1997 (Luftman et al., 2006). In the 2007 survey, the rankings changed but they were joined by several new ones (Luftman and Kempaiah, 2008). They conclude that to improve business-IT alignment, organizations need to address both the enablers and inhibitors whilst

acknowledging that both IT and business environments are extremely dynamic and IT executives and business partners need to consider about the implications of their decisions and how to work together in preparing for the future (Luftman and Kempaiah, 2008).

Table 3-5 Enablers – Ranking of Importance SIM Surveys

X	Rank	2007 Survey (Luftman and Kempaiah, 2008)	2005 Survey (Luftman et al., 2006)	2003 Survey (Luftman et al., 2006)	1993 – 1997 (Luftman et al., 2006)
	1.	Senior executive support for IT	IT understands the firm's business environment	IT understands the firm's business environment	Senior executives' support for IT
	2.	IT understands the firm's business environment	Senior executive support for IT	Close partnership between IT and business	IT involvement in strategy development
	3.	Close partnership between IT and business	Close partnership between IT and business	Senior executive support for IT	IT understanding of the business
	4.	IT and business personnel have close personal relationships	IT demonstrates strong leadership	IT plans linked to business plans	Business-IT partnership
	5.	IT plans linked to business plans	IT plans linked to business plans	IT demonstrates strong leadership	Well-prioritized IT projects
	6.	Good communications between the IT organization and the business	IT and business have close relationship	IT and business have close relationship	IT demonstrating strong leadership
	7.	IT organization demonstrated strong leadership	IT meets commitments	IT meets commitments	
	8.	IT organization meets	IT involved in business	Good IT-business	

		commitments	strategy development	communication	
	9.	IT organization involved in business strategy development	Good IT-business communication	IT involved in business strategy development	
	10.	Clear ownership of IT-business alignment	Clear ownership of IT-business alignment	IT efforts are well prioritized	
	11.	IT efforts well prioritized	Goals and visions are defined	Goals and visions are defined	
	12.	Goals and visions are defined	IT efforts are well prioritized	IT achieves its strategic advantage	
	13.	IT enables strategic advantage	IT achieves its strategic advantage	IT resources shared	
	14.	IT resources shared.	IT resources shared		

Table 3-6 Inhibitors - Ranking of Importance SIM Surveys

XI	Rank	2007 Survey (Luftman and Kempaiah, 2008)	2005 Survey (Luftman et al., 2006)	2003 Survey (Luftman et al., 2006)	1993 – 1997 (Luftman et al., 2006)
	1.	Lack of senior executive support for IT	Business communication with IT	Senior executive support for IT	IT/business lack close relationships
	2.	Business units' lack of understanding of the firm's business	Clarity and predictability of corporate goals/directions	Influence of headquarters' leadership	IT does not prioritize well
	3.	Business units'	Influence of	Business	IT fails to

XI	Rank	2007 Survey (Luftman and Kempaiah, 2008)	2005 Survey (Luftman et al., 2006)	2003 Survey (Luftman et al., 2006)	1993 – 1997 (Luftman et al., 2006)
		lack of support for corporate-wide IT initiatives	headquarters' leadership	communication with IT	meet its commitments
	4.	Lack of clarity and predictability of corporate goals and directions	Business commitments of budgets to IT investments	Business commitments of budgets to IT investments	IT does not understand business
	5.	Business units competing for IT resources rather than sharing	Business commitments of staff to support IT investments	Linkage of individual business unit plans to strategy	Senior executives do not support IT
	6.	= Business communication with IT = Resistance from senior executives	Business units' prioritization of IT needs	Clarity and predictability of corporate goals/directions	IT management lacks leadership
	7.		IT and Business governance	Linkage of individual business unit plans to strategy	
	8.		Linkage of individual business unit plans to strategy	IT and Business governance	
	9.		Lack of senior executive support for IT	Business commitments of staff to support IT investments	
	10.		Lack of clear ownership of IT-business alignment	Business units' prioritization of IT needs	

XI	Rank	2007 Survey (Luftman and Kempaiah, 2008)	2005 Survey (Luftman et al., 2006)	2003 Survey (Luftman et al., 2006)	1993 – 1997 (Luftman et al., 2006)
	11.		Resistance from senior executives	Business units' lack of support for corporate-wide IT initiatives	
	12.		Business units' lack of support for corporate-wide IT initiatives		
	13.		Antiquated business processes in business units		
	14.		Business units' lack of understanding of the firm's IT environment		
	15.		Business units competing for IT resources rather than sharing		

Over the period of the surveys three elements have remained at the top of the enabler importance list whilst only one has survived through from the inhibitor list. In terms of enablers the importance of 'Senior executive support for IT' was ranked as the top enabler by both IT and non-IT executives in the first and last survey. In the original survey, they identified that non-IT executives ranked this enabler even higher than IT executives which they felt highlighted the need for business to be aware and supportive of technology

innovations. Business executives therefore needed to: recognize the value of IT; define and communicate vision and strategies that include the role of IT; and sponsor IT projects by, inter alia, proving leadership and funding. Failure to provide this support could translate into lack of funding and missed opportunities for innovative application of ITs. This seems to have stood the test of time and was also one of the top five inhibitors from the original survey. The second enabler 'IT understands the firm's business environment' was that IT needs to understand the firm's business environment (customers and competitors). Here important issues included: IT understands the business; business understands IT; IT communicates in business terms; IT focuses on applying technical understanding to identify business opportunities. In the more recent survey, a similar complexity has arisen as an inhibitor in that it raises the fact whether business units understand the firm's business. Whether this has to do with the increasing size and globalisation of companies is not explained. The third enabler is 'Close partnership between IT and business' which also appeared as an inhibitor in the original survey. This was identified by IT executives as the lack of a close working relationship. At that time, Luftman et al. (1999) suggested that this was not surprising, given that in most organizations IT executives do not participate in strategy formulation. The business priorities are set where value or benefits are expected to accrue or be realised, to do this the business executives set policies, projects or programmes for the acquisition, use or retirement of information assets. This may still be the case and requires further research. Turning to inhibitors the only one to make the current inhibitor list was discussed earlier whilst the remaining concerns have over the differing survey periods found themselves moving from an inhibitor to an enabler as they all now appear within the top 11 enabling factors being: IT/business lack close relationships (3); IT does not prioritize well (11); IT fails to meet its commitments (8); IT does not understand business (2); and IT management lacks leadership (7).

3.6.4 Issues emerging from alignment via Critical Success Factor

The enablers and inhibitors identified in the SIM surveys provided an indication of thinking at that snapshot in time with no clear explanation as to how the results link to environments, sectors or SAM components. As King (2006) indicates there exists a significant body of work identifying and describing critical success factors for information systems but these are not generally linked to outcomes.

3.7 Alignment via a Performance Management Framework

Van Der Zee and De Jong (1999) in their description of business management quote Drucker (1988) asserting that business needed a 'score to play' being a set of strategic guidelines and performance targets structured around: goals that clearly stated management's performance expectations for the enterprise and for each part and specialist; and organised feedback that compares results with these performance expectations. This idea was further developed by a research group consisting of consultants, representatives from a select group of U.S.A. Fortune 500 companies, and academics. This consortium, initiated by the Nolan Norton Institute, developed a new framework for business planning and the measurement of business performance, the Balanced Scorecard (BSC) (Nolan Norton and Co., 1991). Introduced in 1992 the BSC was promoted as a performance measurement system to drive the implementation of strategies and has been translated into a general framework which translates strategies into objectives (Kaplan and Norton, 2004a, 2004b, 2004c, 2004d, 2004e, 2008). BSC's have been widely utilised and Kaplan and Norton have presented their use based on case examples across a range of organisations where they provide evidence that companies using a formal system for implementing strategy outperform their peers. Osama (2006) whilst researching the use of performance frameworks for use in R&D produced a useful summary of structural and derived features of BSC (Table 3-7).

Table 3-7 Multi-Attribute Strategy and Performance Architectures in R&D (Osama, 2006)

Structural Features (SF)	Derived Features (DF)
SF1: Uses perspectives to achieve "balance" between multiple performance dimensions	
	DF1: Puts strategy at the heart of performance measurement activity
	DF2: Emphasizes focused and differential strategies
	DF3: Provides an (implicit) model of metrics selection driven by strategy and perspectives
	DF4: Provides a framework for undertaking process re-engineering and improvement
SF2: Establish cause-and-Effect linkages between various performance perspectives	
	DF5: Provides a measurement framework that is meaningful and actionable.
	DF6: Provides a means for ascertaining the "correctness" of adopted strategy
	DF7: Provides a mechanism for double-loop "strategic learning"
SF3: Provide a mechanism to map an organization's strategy	
	DF8: Provides a mechanism for simplifying and communicating organization's strategy
SF4: Replicate the Balanced Scorecard throughout the organization by "Cascading"	
	DF9: Operationalize the organization's strategy into local/individual-level terms
	DF10: Provides focus (on strategy) and goal alignment within the organization
	DF11: Provides a mechanism for employee involvement and empowerment

DF12: Provides a means for linking incentives and rewards with strategy
SF5: Put Balanced Scorecard at the center of the Strategic Management Framework
DF13: Achieves alignment between and eliminates redundancy among management functions
SF6: Ensure structural flexibility and adaptability to various organizational forms and Circumstances

As indicated earlier it has four quadrants: financial perspective, stakeholder (customer) perspective, internal processes; and learning and growth. The learning growth perspective, identified by Kaplan and Norton (1996), was sub-divided into the three areas of intangible assets (organisational capital, information capital, human capital) which, when aligned, showed a state of readiness. All of these perspectives align with the identified vision. Kaplan and Norton (2004d) outline the use of strategy maps as part of their BSC approach. The maps indicate that when the components within the learning and growth perspective are aligned with the strategy, the entity has a high degree of organisational readiness. This is characterised as being high when: human capital capabilities in strategic job families are aligned closely to the strategic themes; information capital provides the vital infrastructure and strategic IT applications that complement the human capital for promoting outstanding performance in the strategic themes; and culture, leadership, alignment, and teamwork reinforce the changes in organisation climate required to execute the strategy. Their research demonstrates the value of these intangible assets derives from their ability to help the organization implement its strategy and that two-thirds do not create strong alignment between their strategies and their human resource (HR) and IT programs (Kaplan and Norton, 2004d).

3.7.1 Issues emerging from alignment via Performance Management

The literature review of alignment approaches through a performance framework have a comprehensive set of examples and evidence base drawn from their use on an international basis. The strengths are particularly well summarised by Osama (2006) demonstrating its rounded approach across a number of derived features.

3.8 Alignment via an Information Systems Development Methodology

The development of computer-based information systems began in the 1950s, went through several major changes owing to the advancement of technological capabilities of computers and the organization's IT needs (Zhang et al., 2005) yet has always remained a challenging task (Siau and Tan, 2005). The early information systems were largely developed and implemented in an unsystematic manner (Mohan and Ahlemann, 2013) with such individualistic approaches often resulting in poor control and management of the development projects, ill-defined user needs, and low user-satisfaction (Avison and Fitzgerald, 2003). As these systems, embedded in a dynamic environment, became increasingly complex, the use of more disciplined methodological approaches proved to be indispensable (Fitzgerald, 1998) and offered: an engineering-like development discipline; provided explicit deliverables; safeguarded the consistency as information systems were being built (Siau and Tan, 2005) and consisted of tested bodies of methods, rules, and assumptions that fit the organisation (Wynekoop and Russo, 1995, Iivari et al., 2000). Iivari et al. (2000) warned that even though a methodological approach to solving complex tasks holds certain benefits, a methodology in itself is no silver bullet.

However many different information systems development methodologies (ISDM) exist with Bubenko (1986) suggesting the number is in the hundreds while Jayaratna (1994) estimates the existence of over 1000 ISDM methodologies. Avison and Fitzgerald (1995) point out that

the numbers might be overestimates because many ISD methodologies are similar and differentiated only for marketing purposes nevertheless acknowledge the proliferation of ISDM and refer to it as "the methodology jungle" being a seemingly impenetrable maze of competing ideas and notions.

3.8.1 Defining the field of Information Systems Development

Mohan and Ahlemann (2013) highlight that one of the most fundamental problems in the literature which they base on the work of Iivari et al. (2000) is the debate on the use of method as opposed to methodology, or vice versa. They find that some authors use method and methodology interchangeably; some think methods encompass methodologies; some think methodologies encompass methods; that some believe that there are no methodologies, only techniques; and that others extend the debate include tools, since some studies regard methods to be tools (Besner and Hobbs, 2006). Siau and Tan (2005) offer a definition of an ISDM, largely based on Avison and Fitzgerald (1995, 2003) and Lyytinen (1987) being: an ISDM is a systematic approach to conducting at least one complete phase of information systems development, consisting of a recommended collection of phases, procedures, techniques, tools, and documentation aids. Mohan and Ahlemann (2013) refer to an ISDM methodology as being: a collection of goal-oriented, problem solving methods/ techniques governed by a set of normative principles (Lyytinen, 1987, Hirschheim et al., 1996), beliefs, and a multi-step procedure that prescribes what to do and how to do things (Checkland, 1999). Typically, these procedures are supported by a set of preferred techniques and tools, and guiding principles (Iivari et al., 1998).

A technique consists of a well-defined sequence of elementary operations that more or less guarantee the achievement of certain outcomes if executed correctly (Iivari et al., 2000). Mohan and Ahlemann (2013) suggest that an ISDM implies a holistic goal-oriented

approach, with cultural, educational, ideological and/or strategic implications, that guides the work and cooperation of the various parties (stakeholders) involved in the development and management of IS/IT (Iivari et al., 1998). Methods and tools are therefore only a subset of methodologies meant to support them (a means to an end) (Iivari et al., 1998). Chan and Thong (2009) provide some examples of traditional ISDMs include structured modelling-based methodology, workflow development methodology (Raghunathan, 1996, Zhuge, 2003), Soft Systems Methodology (Checkland, 1990) and Unified Process (Siau and Tan, 2005). Chan and Thong (2009) also draw attention to the fact that ISDMs are constantly evolving to keep up with changing technologies and satisfy new demands from users. More recently, a new generation of ISDMs called agile methodologies is claimed to be better suited for dealing with the dynamic business environment (Koch, 2005) and these are discussed later in this chapter.

3.8.2 The evolution of ISDM

Avison and Fitzgerald (2003) offered a review of the history of ISDM and split the evolution at that time into four eras being: *Pre-methodology*, from 1960s to 1970s, where computer applications were developed without explicit or formalized methodologies and to a great extent, depended on individual programmers' experience and expertise; *Early-methodology*, from late 1970s to early 1980s, where important phases and stages of ISDM were identified in order to improve the management of information systems development and introduce discipline with a dominant ISDM approach being the System Development Life Cycle (SDLC); *Methodology*, from late 1980s to early 1990s, where numerous new approaches and tools emerged in response to one or more limitations that are associated with SDLC approach however the proliferation of ISD methodologies and approaches is in contrast with their *sluggish* adoption by organizations; *Post-methodology*, from late 1990s to papers presentation in 2003, with an era characterized by a serious reappraisal of the usefulness of the earlier ISD

methodologies and some organizations turning to yet different methodologies and approaches, while others abandoned methodologies altogether.

3.8.3 The use of earlier structured methodologies

Mohan and Ahlemann (2013) present, as identified by Fitzgerald (1998), some of the most fundamental concepts that justify the use of structured methodologies. Firstly, they reduce complexity by subdividing the development and management process into plausible and coherent steps. Secondly, they increase transparency and therefore control of the development process, thus reducing risk and uncertainty. Thirdly, they provide a goal-oriented framework that helps to direct the application of techniques and resources at appropriate times during the development and management process. Fourthly, they enable the standardisation of the development and management process. Finally, they facilitate the application of lessons learned from past experiences, increase productivity and quality through better prediction and availability of resource requirements.

Siau and Tan (2005) suggest that after initial wide adoptions, ISDM's were at a critical junction and that serious appraisals of the usefulness of the earlier ISDM's were necessary for organizations to make informed decisions about ISDM adoption and usage. More recently, Mohan and Ahlemann (2013) reviewed earlier use of methodologies and concluded that despite the overwhelming advantages of using an IS methodology, only a handful of organisations were able to develop and implement one that was useful to the individuals that actually had to use it and according to Glass (1999) only about 50% of organisations were able to motivate their staff to use such IS methodologies . After conducting a survey Russo et al. (1996) reported that only 6% of organisations claimed that their methodologies were always used as specified whilst in another by Eva and Guilford (1996), conducted with 152 organisations, found that only 17% of respondents used a methodology as a whole. Thus,

overcoming resistance to IS methodology acceptance at an individual level was a critical area of concern in IS research (Hardgrave et al., 2003).

3.8.4 Critical influences affecting software development

Stankovic et al. (2013) report on the focus of interest of many managers, engineers and researchers to the process of software development due to large percentage of failures ranging from the inability to provide software solution that fits the requirements on time, to providing solutions that are a *maintenance nightmare* or in the worst case inability to provide any solution at all (abandoned software projects). They suggest the main problems that is causing the above mentioned difficulties is that during the project both technology and the business environment change (Williams and Cockburn, 2003) with technology advancement currently being even more dynamic. This results in customers having difficulties not only to state their needs in the beginning of the project but even to have a basic idea of what they need at that time and to form requirements only after a few iterations of the demonstrated product.

3.8.5 An Agile Approach

To overcome these challenges agile software development approaches have been proposed to improve a software team's ability to embrace and respond to the changing requirements (Stapleton, 1997, Coad et al., 1999, Schwaber and Beedle, 2002, Beck and Andres, 2005) with the notion of software development agility, which is defined by Lee and Xia (2010) as a software team's ability to efficiently and effectively respond to user requirement changes. Dingsøyr et al. (2012) outlined at its core, agility entails ability to rapidly and flexibly create and respond to change in the business and technical domains(Highsmith and Cockburn, 2001, Henderson-Sellers and Serour, 2005). Other aspects of agility reported include lightness or leanness (i.e., having minimal formal processes) (Cockburn, 2007) and related concepts such as nimbleness, quickness, dexterity, suppleness or alertness (Erickson et al., 2005). In

essence, these ideas suggested a light methodology that promotes manoeuvrability and speed of response (Cockburn, 2007) with agile approaches viewing the software development process as dynamic, evolving, and organic, rather than static, predefined, and mechanistic (Highsmith, 2000, Beck and Andres, 2005).

Prominent members of the agile development community formally introduced and endorsed four core values and 12 principles of agile development in the publication of the Agile Manifesto (Beck et al., 2001) thus stimulating much interest from the software industry (Dybå and Dingsoyr, 2008). The Agile Manifesto set out that agile development: values individuals and interactions over processes and tools; working software over comprehensive documentation; customer collaboration over contract negotiation; and responding to change over following a plan (Beck et al., 2001). It minimises time-consuming and costly software processes such as detailed front-end planning and heavy documentation through employing light and barely sufficient methods (Boehm and Turner, 2004, Fitzgerald et al., 2006). Agile development attempts to effectively manage volatile and changing user requirements via a variety of practices and techniques (Beck and Andres, 2005) by promoting frequent and continuous delivery of working software, embracing changing requirements, establishing close collaboration between developers and users, self-organizing and empowered teams, face-to-face communication, technical excellence, simplicity, and continuous adaptation (Beck et al., 2001). Dingsøyr et al. (2012) expand on these practices and highlight that, to start with, there was a distinct move towards collaborative development, with people being accorded privileges over processes that formerly constrained them. Secondly, a dominant "lean" mentality was advocated with a view to minimizing unnecessary work, particularly with regard to the creation of wasteful documentation. While this was misconstrued by many to mean "no documentation", the discerning realized that this meant documenting only what

was absolutely necessary and nothing more. Thirdly, customers/stakeholders were no longer just at the fringes of software development, but actively shaped and guided the evolution of the end software product or service. Finally, there was an acceptance of the fact that uncertainty was a part and parcel of software development, and that the inherent tendency to control variations through statistical and other means was futile.

A number of approaches have received praise from practitioners due to their abilities to deal with volatile requirements (Reifer, 2002) and Lee and Xia (2010) set out some commonly used agile development methods and principles which include: Scrum (Rising and Janoff, 2000, Schwaber and Beedle, 2002) where the software team determines features of each sprint, a set period of time during which specific work has to be completed and made ready for review, from an evolving product backlog to create an increment of potentially shippable software; eXtreme programming (XP) (Beck, 2000, Beck and Andres, 2005) where the highest priority is to continuously satisfy changing customer needs utilising rapid user review and feedback; Dynamic Systems Development Method (DSDM) (Stapleton, 1997) where development is iterative, incremental, driven by user feedback and delivering a perfect system is less important than delivering a system that addresses the current business need; and Feature- Drive Development (FDD) (Coad et al., 1999) with customer/feature-centred iterative cycles and regular build and inspection to ensure up-to-date systems. The agile approach is basically driven by self-organizing teams that have the power to coordinate their work on their own thereby deciding how work is coordinated and having complete control over development process and introduction of new features (Stankovic et al., 2013). This has the effect of increasing productivity, enables employees to learn, innovate, and finally makes them happy with what they do (Smite et al., 2010) but can bring tensions. Such working practices are in contrast with the traditional plan-driven (waterfall) software development

processes where work is coordinated by managers and there is a clear separation of roles (Moe et al., 2010). This is also the tendency in larger organizations where people are organized around component teams thereby grouping people in the way that they have the influence over the small part of the product thus giving the teams less control and losing the ability of close collaboration. Introducing new features in the organization of that kind requires synchronization of many different component teams (Stankovic et al., 2013). Lee and Xia (2010) conclude that although many benefits of agile development have been claimed, and increasingly more organizations have adopted the approach, there have been few empirical field studies that have examined if, how, and why agile development is effective (Fruhling and De Vreede, 2006, Moe et al., 2008) with the result that agile development lacks theoretical underpinnings and scientific evidence to support its claimed benefits and key principles (Erickson et al., 2005).

3.8.6 Issues Emerging an Information Systems Development Methodology

Several studies (Eva and Guilford, 1996, Russo et al., 1996, Glass, 1999) suggest that the use of methodologies is limited in practice, and that even when they are used are not literally applied or open to local interpretation. This highlights a fundamental flaw in the methodology engineering whilst other authors go so far as to suggest that methodologies are useful to beginners, rather than to experienced individuals (Iivari et al., 2000) adding their observations that developers used methodologies to complete deliverables and as insurance, to deny responsibility in case of project failure. This concurred with the conclusions of the work on the use of methodology manuals by (Hidding, 1997) finding that even though practitioners seldom read methodology material, they are still able to produce the deliverables. Huisman and Iivari (2006) studied the perceptions of IS managers and developers, and found that managers had more positive views on the use of ISD

methodologies than the developers concluding that ISD methodologies reflect management's agenda, implying different expectations, assumptions and norms.

This suggests further evidence for the widespread understanding that while developing and implementing IS methodologies, organisations often do not consider the values, beliefs and needs of the actual users of those methodologies. This was also a factor in a related study, Iivari and Huisman (2007) who found that organisational culture orientations, especially hierarchical and rational organisational cultures, affect the use of ISD methodologies. Moreover the positive views of managers and culture may be a factor why many organizations, and especially large organizations, still base their software development around plan driven or component teams (Stankovic et al., 2013). Chan and Thong (2009) report that it has been shown that non-technology factors, such as individual characteristics and organizational characteristics, can also affect the acceptance of SDMs, and even dominate the characteristics of SDMs in some cases (Sultan and Chan, 2000). They add that when migrating to agile methodologies Nerur et al. (2005) highlight that this involved many issues pertaining to management, people, process, and technology and other important organizational factors in acceptance of SDMs (Cho and Kim, 2001). Chan et (2009) emphasise from case studies on agile methodologies the suggestion that customers play a critical role in agile development and the success of agile development hinging on finding customers who actively participate in the development process and suggests that factors associated with customers would be crucial to the alignment of software solutions with services where adopting an agile approach or methodologies. However, Siau and Tan (2005) reported that considerable attention was being devoted to developing ISDM, yet the evaluation of existing ISDM was not keeping pace with the rapid growth and variety.

3.9 Alignment approach within the Public Sector

Within Wales, the methodology used to bring about strategy achievement, discussed in chapter two, is not visible or articulated. This review of the research area has established that no predominant structured alignment methodology have been utilised in practice within the UK public sector involving health. The literature did identify studies which crossed over from system thinking into aspects of better alignment through the use of process improvement with reviews within the public sectors of Scotland (Radnor et al., 2006) and Wales (Zokaei et al., 2010). McNulty and Ferlie (2004) in their literature review and research within an NHS hospital draw attention to factors which include: ideological and cultural issues around change to structure and processes; complexity of transformation operating at several levels in the organisation; recognition of weaknesses of existing templates; and capacity for action in terms of understanding, managing the journey, skills and competence. In addition, they advise that consideration should be given to changes in what are commonly vertical lines of reporting through performance management and the ethos of control and coordination. This suggests that aspects of organisational culture, management structure, lines of accountability, capacity and capability are key factors which need consideration within alignment. Other barriers included: lack of clear customer focus; too many procedures; people working in silos; too many targets; lack of awareness of strategic direction; general belief that staff are overworked and underpaid; lack of understanding of the effect of variation, systems thinking and process flow (Hazlett and Hill, 2000, Silvester et al., 2004). In the UK public sector, the PGM function has come to the fore as a result of changes in procurement where traditionally, procurement of infrastructure assets was sequential; with a clear separation between the project life cycle phases (Aritua et al., 2010). This often results in multi-project environments with a combination of projects which may be construction projects, cultural change initiatives, organizational reconfiguration, or rationalisation of assets. From this perspective,

the PGM function is seen as a means for considering issues relating to the content of individual projects and the overall strategic change context. The conceptual model used by Aritua et al. (2010) suggests that projects and programmes provide strategic fit between policy and organisational strategy, and benefits realisation. Limited literature is available to support the classification and use of enablers and inhibitors although governmental documentation (Public Accounts Committee, 2009) can assist in identifying failures or shortfalls. Finally, the use of performance frameworks has a large case study library of examples across the private sector although the number referencing public sector examples in the UK provided a limited opportunity to review.

3.10 Alignment Conclusions

There is an opportunity to enable the public services in NHS Wales to achieve significant economies of scale and underpin service changes to accommodate the reducing financial envelope. These require a system which brings enhanced alignment of business priorities to ICT requirements and are themselves delivered in a timely and quality assured manner. The literature research has identified a significant body of work in support of ICT business alignment yet the process used to achieve alignment is under-researched and the nature of alignment is inadequately clarified (Avison et al., 2004). Models and best practice exemplars are published although they remain characterised by being intensive, require long timescales, are process orientated, and more conceptual than practical. Implementation methods use terms and principles interchangeably and literature refers to different strengths of programmes as compared with projects. However, there are gaps in the literature around the practical use of alignment approaches under constraints of time and resources. Studies have identified cross-overs between alignment methodologies and other process improvement techniques. In particular, there is limited evidence around PSICT alignment or many case

examples of successful transformations which could be developed to make a significant and original contribution to existing theoretical thinking and practice in the alignment area.

3.11 Summary of literature issues for the Research Domain

This chapter provided a comprehensive literature review on the areas derived from the research question of the study outlined in chapter two and provided further explanations, evidence and knowledge upon which to develop appropriate research objectives. Each theme presented areas which current knowledge has evidenced as important to alignment and these are summarised below.

Conceptual models conclude that IT-enabled strategic change:

- involves the interplay of strategy, structure, people, management processes and technology (Hsiao and Ormerod, 1998, Luftman et al., 1999)
- that firms have to negotiate these factors collectively to achieve advantage (Hsiao and Ormerod, 1998)
- models need to be practically relevant, not just conceptually relevant (McKay and Marshall, 1999)
- implemented as a dynamic process and planning (Avison et al., 2004)
- flexible enough to allow an organisation to take advantage of opportunistic developments, without having to improvise and disregard all planning (Avison et al., 2004)

Systems approaches highlight alignment considerations:

- the need to think as a system
- avoid top down approaches
- encourage the design to be done by the workers

- ensure participation at all levels so participants then become part of the solution as champions
- understand the whole picture including benefits further down the chain
- understand the types of demand and create a system which can absorb variety.

Evidence from the use of methods and methodologies suggest:

- alignments are challenging because the objectives of the business strategy are not always well-communicated
- understanding these alignments may be one of the major challenges to effective PJM.
- the process used to achieve the PJM and Business strategy alignment is under-researched (Srivannaboon and Milosevic, 2006).

The evidence around Critical Success Factors suggests:

- a need to provide an enhanced and practical application of critical success factors to aid alignment.

Performance Management frameworks have limitations in alignment potential around:

- being able to force decision making at a detailed component level
- handling time and transitions within the more visual aspects such as strategy maps (Kaplan and Norton, 2004d).

Within ISDM Siau and Tan (2005) highlighted important ramifications of a dearth of research on ISDM evaluation being:

- failure to evaluate currently used ISDM, may lead organizations to not clearly comprehend the usefulness and effectiveness of ISDM;

- the lack of ISDM evaluation could inhibit practitioners and researchers trying to understand the strengths and weaknesses of various methodologies being critical knowledge for improving existing methodologies or designing new ones.

The conclusion of the literature review is that alignment remains an imperative task for both practitioners and researchers and warrants more research, therefore, any additions to the literature base through this study would be of value to both academics and practitioners. To achieve this, a set of structured objectives were set out to address the research question within the context of the reviewed literature and the research domain. The research objectives (RO) were:

RO1- To assess what influences national policies and strategies have upon alignment of ICT and the NHS Wales

RO2 - To identify factors important to alignment in NHS Wales including drivers, barriers, knowledge, individual motivation and beliefs

RO3 - To explore the use of alignment models, frameworks, methodologies and best practice guidance

RO4 - To explore the incidence of new approaches emanating from other domains of knowledge including System of Profound Knowledge, System Thinking, Lean, and Theory of Constraints

RO5 - To identify the alignment enablers and inhibitors experienced within NHS Wales

RO6 - To propose approaches which should improve alignment of ICT and the service provided by NHS Wales.

The following chapter took these research objectives and considered them as part of the selection of an appropriate research methodology.

Chapter 4 – The Methodology

4.1 Selection of the appropriate research method

This chapter identified and justified the selection of the appropriate research method to fulfil the research question of this study in chapter two and drawing on the literature surrounding alignment formulated into objectives of enquiry in chapter three.

This chapter was organised into four parts. Firstly, this chapter considered the research question of the thesis to establish the most appropriate methods for achieving valid and reliable results. Secondly, the research design deployed within this study was considered, with the articulation of a research protocol outlining the principal methods employed, namely a longitudinal case study. Thirdly, the analysis of the results process was explained for the research methods deployed. Finally, the chapter considered the issues of ethics and confidentiality. The next section considered the research question and objectives to be addressed when commencing the study.

4.2 Research question and objectives for the study

The research question for this study set out in chapter two (2.22) was to investigate and subsequently identify factors which could improve the alignment of ICT within public services at a time of economic recession which has required significant delivery transformation to achieve organisational efficiency and sustainable change. Following the review of the literature the conclusions in chapter three (3.15) were translated into the following six research objectives which were used as a basis for the research.

RO1- To assess what influences national policies and strategies have upon alignment of ICT and the NHS Wales

RO2 - To identify factors important to alignment in NHS Wales including drivers, barriers, knowledge, individual motivation and beliefs

RO3 - To explore the use of alignment models, frameworks, methodologies and best practice guidance

RO4 - To explore the incidence of new approaches emanating from other domains of knowledge including System of Profound Knowledge, System Thinking, Lean, and Theory of Constraints

RO5 - To identify the alignment enablers and inhibitors experienced within NHS Wales

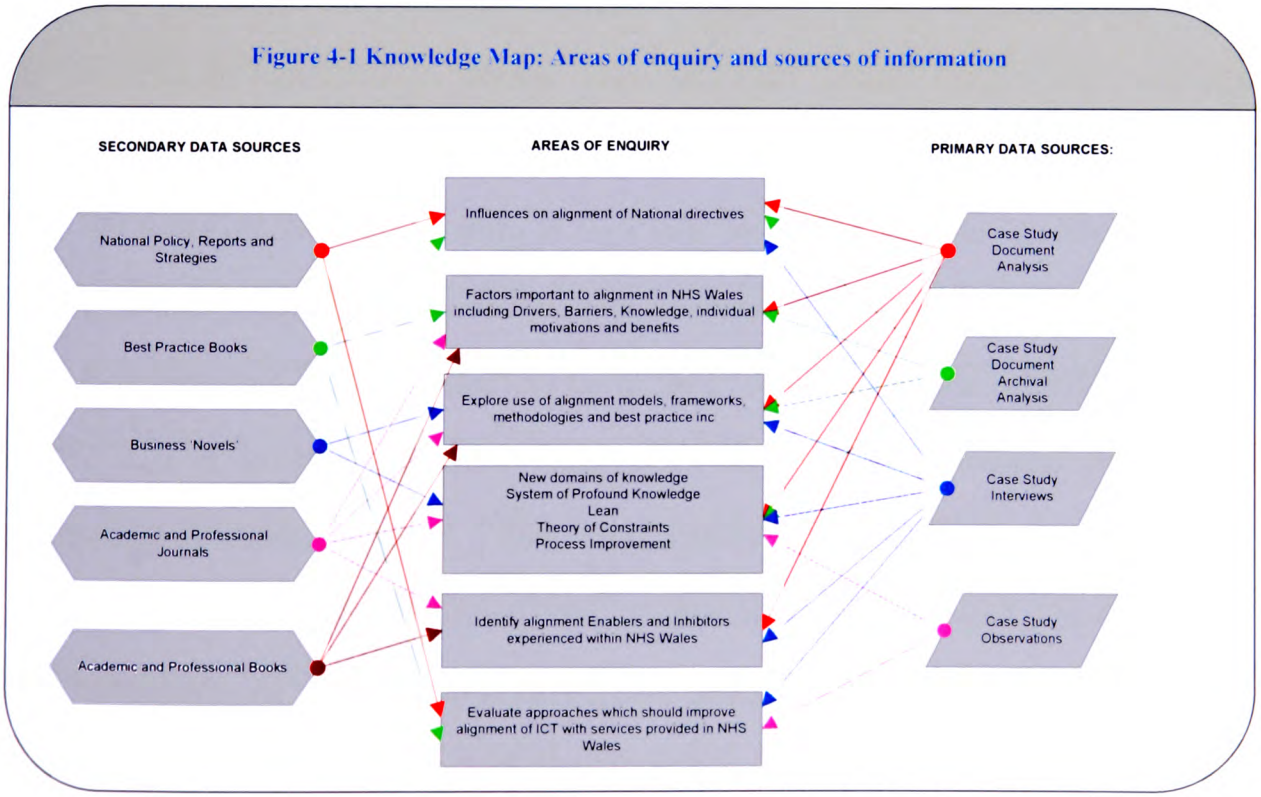
RO6 - To propose approaches which should improve alignment of ICT and the service provided by NHS Wales.

4.3 Choice of Research Approach

According to Saunders et al. (2007) a research strategy is a general plan of how the researcher will go about answering the research questions(s). Creswell (1998) suggested that the main criterion for the choice of strategy was the choice of approach in undertaking the research coupled to the research objectives. Creswell (2003) suggested criteria which could be used when choosing a research approach: the nature of the research topic; the time available of the researcher; and the extent to which the researcher is prepared to indulge risk. Considering these criteria, in the context of the research question and objectives, it was proposed to undertake a qualitative approach with data collection at a primary level to better understand the alignment of technology and business within NHS Wales. Collis and Hussey (2003) suggest that adopting an inductive approach leads the researcher to consider

methodologies such as action research, case studies and grounded theory. In this research, a case study strategy was proposed which would collect data from documents, individuals and a limited amount of observation. This was chosen as it is consistent with the inductive research approach where learning by reflecting upon past experiences leads to formulation of abstract concepts, theories and generalisations that explain past, and predict future (Gill and Johnson, 1997). In addition, the data collected can be drawn from a variety of methods to produce 'soft' subjective data (Collis and Hussey, 2003) and allows for the collection of a certain amount of data from a sample being 'a subset of a population representing the main interest of the study' (Collis and Hussey, 2003). It would, however, require an appropriate location for the research to be identified within NHS Wales. The knowledge map (Figure 4.1) was then updated to identify the links between the research objectives and the primary and secondary data sources.

Figure 4-1 Knowledge Map: Areas of enquiry and sources of information



4.4 The Rationale for Case Study Research

Eisenhardt (1989) defines a case study as a research study which focuses on understanding the dynamics present within single setting and Bonoma (1985) adds that this must be constructed to be sensitive to the context in which management behaviour takes place. Information is gathered, usually a single unit of analysis e.g. an organisation or group of staff, over a long period of time to obtain detailed knowledge particularly around the variables or phenomena. They are used where few theories or limited knowledge exists and Scapens (1990) outlines the following types of case study: descriptive (objective is limited to describing current practice); illustrative (show new and possibly innovative practices adopted by particular companies); experimental (examine difficulties of implementing new procedures, techniques and evaluate the benefits); and explanatory (existing theory is used to understand and explain what is happening). In addition, Otley and Berry (1994) identify a type of case study which occurs by chance (researcher has access and opportunity) producing significant and original results. Other case study research characteristics identified by Yin (1994) include: aim is not only to explore certain phenomena but to understand them within a particular context; does not commence with a set of questions and notions about the limits within which the study takes place; and uses multiple methods for collecting data which may be both qualitative and quantitative. Data in all of these types can be collected through documentary analysis, interviews and observation. It remains possible to take a more positivistic approach whereby the research starts with a strong theoretical foundation and specific research questions (Collis and Hussey, 2003) which can be used to explain what is happening in the relationships (Scapens, 1990). This is described as an explanatory study (Saunders et al., 2007) and this approach at the selection stage was identified as a potential way forward for use in the study.

Within a phenomenological study it is important to use the data collected through interviews and other methods by quoting at length and also using diagrams to highlight emerging patterns. A case study approach has limitations in that they can be time consuming and access to data within organisations can be difficult to access. Moreover, it is important to acknowledge that the need to understand events and what happened in a particular period, before and after that time. The purpose of this study was to understand the alignment of technology and business within NHS Wales, a complex environment, requiring a more subjective data gathering technique and it was decided to select the case study approach as being the most appropriate for this research project.

4.5 Selection of a case study

The development of IT solutions within Wales has an established history but tended not to be tested outside of the country in the wider UK environment. In addition, they have predominantly been developed within in-house resources on a site specific instance. The case study required the opportunity of considering a successful alignment not just within Wales but which had proven alignment and use in the wider UK public service. Two areas were initially identified one in Child Health Services and the other in Audiology Services. The latter area fitted Ciborra's (1997) characteristics of successful business and IT alignment within NHS Wales, NHS England and beyond into Europe. It had the additional attraction of having been developed in North Wales with a commercial supplier, the key individuals, limited in number due to retirements, were available and willing contributors for the research and presented the opportunity to view the research as a historical case study where the data existed for reflection over an extended time period and cycle. The solution AuditBase (developed by Auditdata) which is a Patient Management System (PMS) used within audiology and hearing aid departments. All the functions of such a service can be managed

within this one system: referrals; waiting lists; booking; hearing tests; ear moulds; stock control; letters and documents; questionnaires; reporting; NOAH (an audiological integration standard); paediatrics; remote laptop use. There are over 120 NHS hospitals currently using AuditBase. It is also used by private dispensing chains, some of which work in partnership with NHS services (Auditbase User Group UK, 2011). Further information on the history is listed on the website which is outlined in Figure 4.2.

Figure 4-2 Synopsis of Auditdata history (auditdata, 2011)

About Auditdata

Back in 1992, Auditdata was founded as a joint venture between Danavox (now GN ReSound) and Claus Bak Petersen. The company was dedicated to the development of software applications for the health sector - modules for programming digital hearing instruments and technical and administrative software systems covering all functions in a hearing clinic.

Soon Auditdata had developed the AuditBase System, which provided advanced software for hospital-based audiology clinics. Today, this system is the leading software system for audiology clinics in public hospitals and interfaces client records, scheduling and audiological diagnostics with central medical record systems. Most hospital hearing clinics in Denmark, Sweden, Norway and Great Britain now use AuditBase for storing all audiologic and hearing instrument data. In fact, in Great Britain alone, there are more than 100 AuditBase installations and in excess of 1,400 users.

In 1999/2000, Auditdata went on to develop a similar system for use by hearing aid dispensers. Aimed exclusively at the German market, Mirage System was supported by a German subsidiary.

Auditdata was managed by Claus Bak Petersen as CEO until 2000 when he sold his holdings in Auditdata to GN ReSound. Subsequently, Auditdata joined the GN Otometrics company in 2003 as a product division. In 2006, Claus Bak Petersen repurchased the company and is now, via the company Sebjerggaard ApS, CEO and owner of Auditdata A/S.

In 2010, Auditdata entered a new chapter in its history with the acquisition of Real Ear A/S. The Real Ear Fitting System is an innovative fitting system that includes everything needed within audiometry, real ear measurements, client counselling and hearing instrument testing.

Today, Auditdata develops and supports total solutions in audiology

This solution was selected as a longitudinal case study and was therefore examining a solution which was specified, designed, developed and deployed initially in NHS Wales before being applied across England and Wales. It has been implemented into audiology departments over the last 20 years and has since been introduced to hearing aid clinics across Denmark, Great Britain, Norway and Sweden. To understand the success of this solution it was necessary to identify individuals who were involved at differing stages of the product life cycle and this will include both individuals within the audiology departments but also suppliers. Initial contacts were made and access was permitted after due process and ethical approval. A case study approach with access to documents and personnel was acceptable to the department heads.

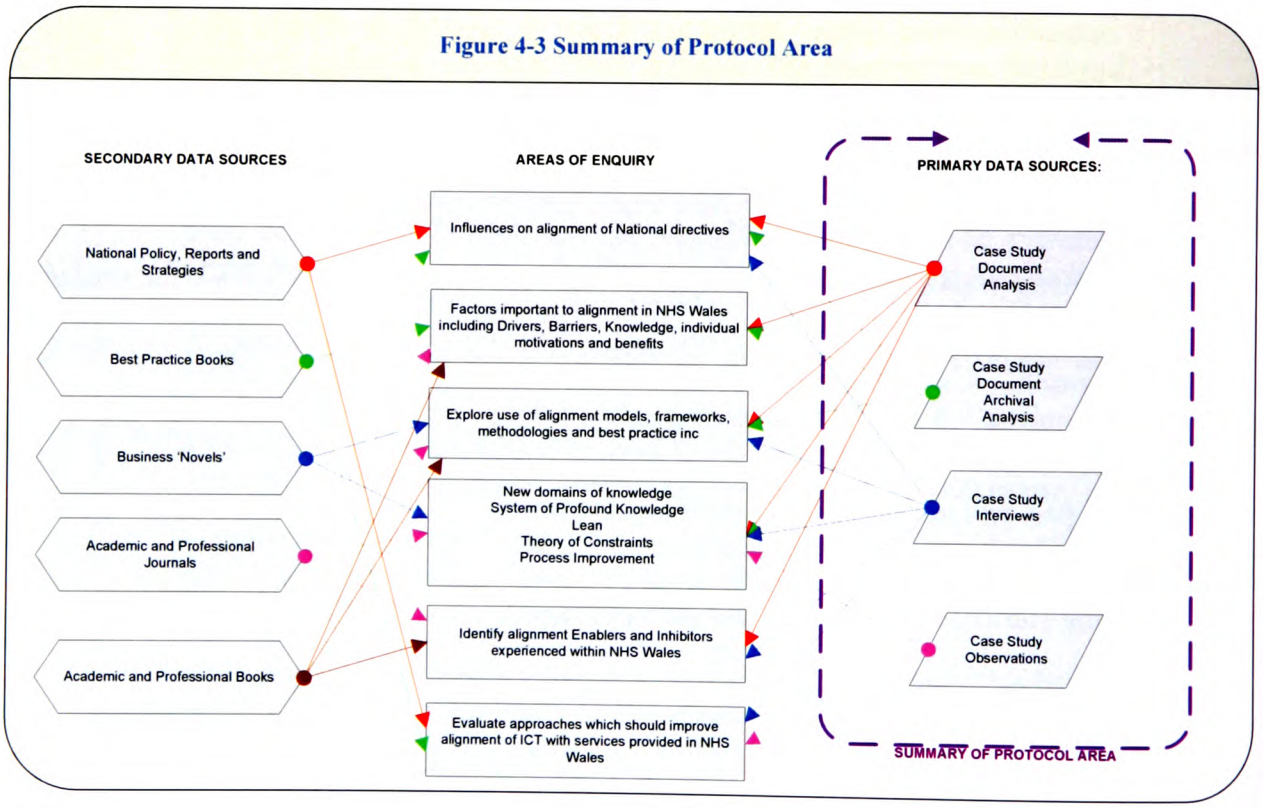
4.6 The design of the case study

A roadmap for building theories from case study research was set out by Eisenhardt (1989) based on previous work on qualitative methods (Miles and Huberman, 1984), the design of case study research (Yin, 1981, 1984), and grounded theory building (Glaser and Strauss, 1967). This resulted in a more complete roadmap for executing this type of research than had existed in the past and advocates the following stages:

1. Getting started; Definition of research question
2. Selecting Cases
3. Crafting Instruments and Protocols; identification of data collection methods
4. Entering the Field; Overlap data collection and analysis including field notes
5. Analyzing Data; within case analysis
6. Shaping Hypotheses; the theory-data relationship
7. Enfolding Literature; comparison with conflicting and similar literature
8. Reaching Closure; empirical and general saturation where possible

Therefore, to ensure consistency and academic rigour, the study recognised the need to adopt a structured process. Yin (2009) recommended the use of a case study protocol which should generally have the following sections: an overview of the case study project; field procedures, case study questions; and guide for the case study report. In this research, a case study strategy was proposed which collected data from documents, individuals and a limited amount of observation. The complete plan of investigation was structured into a research protocol and its scope superimposed upon the Knowledge Map (Figure 4.3) which was updated to identify the links between the areas of enquiry and the primary and secondary data sources.

Figure 4-3 Summary of Protocol Area



4.7 Case Study Protocol

The following section described the case study protocol including its research question and objectives, field procedures, and guide to the case study report.

4.7.1 Research Question

The research question was: What are the factors which could improve the alignment of ICT within public services at a time of economic recession which has required significant delivery transformation to achieve organisational efficiency and sustainable change? The unit of analysis was the audiological information system implemented across North Wales. The key evidence was collected from participants working within the audiology environment over the period Nov 11 to Jun 12 through a series of semi-structured interviews, allowing them to supply information on a wide variety of issues related to the design, development and deployment of the department system. A list of research topics were developed to provide an agenda for each interview although participants were to be able to add other dimensions as the interview progressed. This gave the opportunity for participants to respond without interference to insure no bias occurred. The key issues on which each interview focused were:

1. Which transformation factors appear critical to the effective implementation and alignment of ICT in NHS Wales in an austere environment?
2. What is the impact of these identified transformational factors in improving the organisational efficiency and sustainable change in NHS Wales?
3. What alignment methodologies underpin the implementation and sustaining of transformation in the NHS Wales context?
4. What are the main impediments that prevent the adoption of identified alignment factors within the ICT sector in NHS Wales?

These issues were determined by the objectives of the study identified within chapter three of this thesis.

4.7.2 Field Procedures

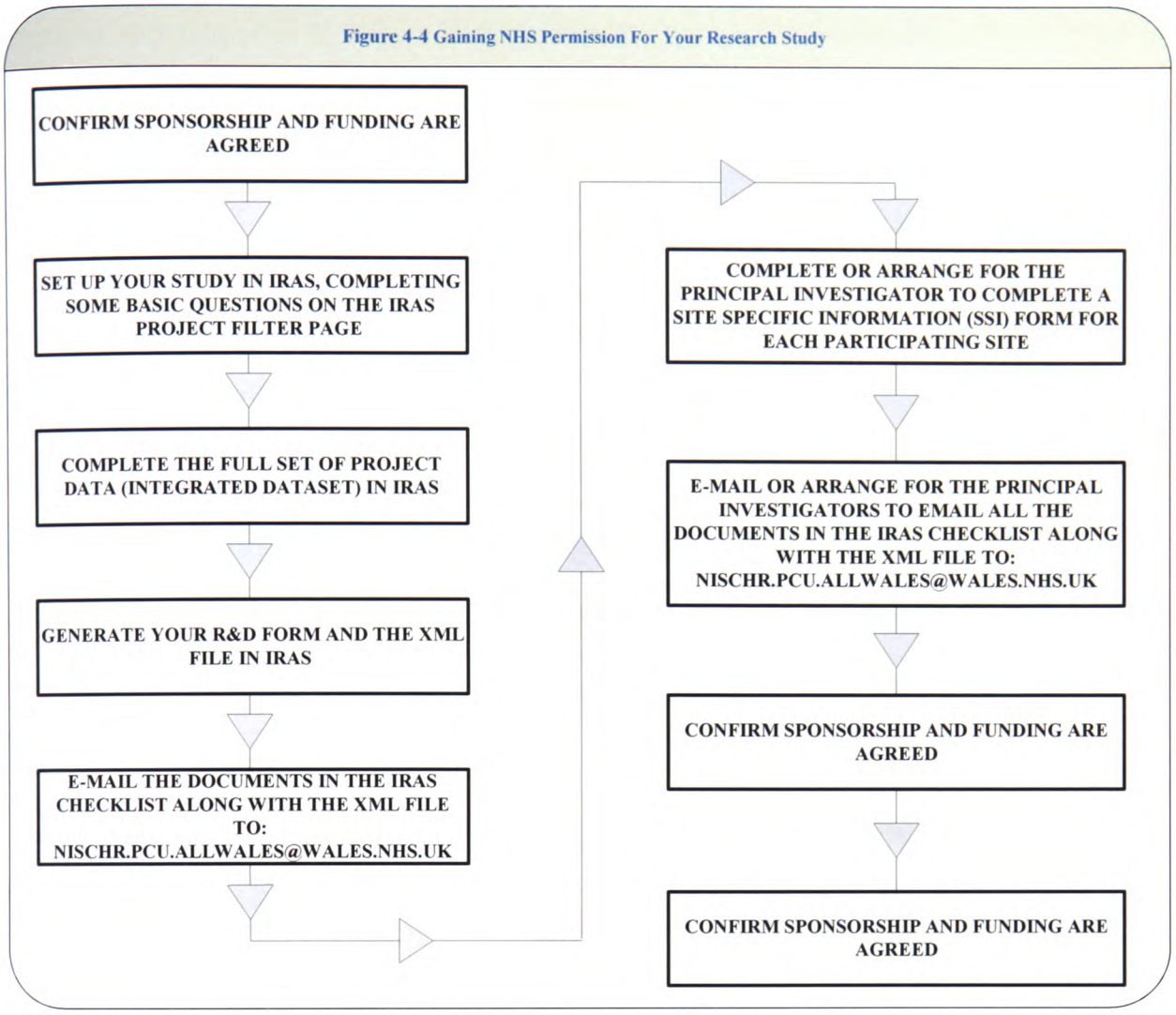
The field procedures provided detail regarding the nature of the case study, and the data collection procedures undertaken which included defining who should be interviewed, accessing the interviews, availability of resources, and scheduling the evidence collection activities. The following field procedures were identified:

4.7.2.1 Study location and setting

The case study was surrounding a solution which was specified, designed, developed and deployed initially in NHS Wales before being applied across England and Wales. It was implemented into audiology departments over the last 20 years and has since been introduced to hearing aid clinics across Denmark, Great Britain, Norway and Sweden.

4.7.2.2 Permissions

To undertake research within NHS organisations in Wales requires permission to be sought via The National Institute for Social Care and Health Research – Permissions Co-ordinating Process (NISCHR PCP). NISCHR PCP is co-ordinated by the NISCHR Permissions Co-ordinating Unit (PCU), working alongside NHS organisations in Wales, who as legal entities are responsible for research carried out in their organisations (NISCHR Permissions Co-ordinating Unit, 2011). Utilising this process has the benefit of using the Integrated Research Application System (IRAS) which is a single point of access thereby providing a clear channel of communication to multi-NHS organisation research. This solution reduces duplication and administration in seeking permissions for research and streamlines the process thereby reducing the time taken to obtain permission and is supported by the National Patient Safety Agency (2012). Submissions are subject to strict criteria (Betsi Cadwaladr University Health Board, 2011) and these are outlined in Appendix E and the process flow (NISCHR Permissions Co-ordinating Unit, 2011) is set out in Figure 4.4.



4.7.2.3 Identification and interview of key participants

To understand the success of this solution it was necessary to identify individuals who were involved at differing stages of the product life cycle and this included both individuals within the audiology departments but also suppliers. These were identified using the inclusion and exclusion criteria shown in Appendix B. Identified individuals were approached informally about their willingness to contribute to the study initially through the Chief of Staff Therapies and Clinical Support CPG in the Betsi Cadwaladr University Health Board. A more formal request was made and when agreement was forthcoming a Participant Invitation Letter was issued (Appendix C) and, in addition, a Participant Information Sheet outlining the main research questions provided (see Appendix D) not less than five working days before the interview date. The requests highlighted this information was not patient related and focused

on individuals' recollections, beliefs and interpretation of events. In anticipation of concerns raised an ethical statement was drawn up and used as part of the access arrangements and this is reproduced later in this chapter.

4.7.2.4 Data Elements

The data elements of the study included the following sources:

a. Documentation - many forms of documentation which included: letters, memoranda, e-mail correspondence, and other personal documents, such as diaries, calendars, and notes; agendas, announcements and minutes of meetings, and other written reports of events; administrative documents – proposals, progress reports, and other internal records; formal studies or evaluations of the same 'case' that is being studied; and news clippings and other articles appearing in the mass media or in community newspapers. In the study this included specialist articles and other web related forums.

b. Archival records - organisational records including: business cases; budget; personnel; project implementation reports; lessons learnt; and benefit analysis.

c. Interviews – to be carried out in appropriate and convenient locations. Initially, the safeguards, limitations to the study, data collection, storage and destruction procedures were to be outlined. At this stage additional confirmation for consent would be sought to undertake a recorded interview. During the interview awareness was to be made of specific reactions or body language which may give indications of areas which required further investigation.

d. Observation - Observational data is useful in providing additional information about the topic being studied and may or may not be relevant to the study due to elements being historical. However, it may assist to understand why the aspects of alignment in the study are so important by providing practical evidence of differences to other solutions and impact on workflow.

4.7.2.5 Storage of Data

All documents and consent forms have been safely stored in locked cabinets (office) and cupboards (home). Access has been restricted to the researcher. An NHS laptop computer was employed which was encrypted and password controlled. This was used to store identifiable data of participants including a participant ID. A personal laptop was used to store audio files, transcriptions and analysis. Such files were stored utilising a participant reference number only. The laptop access was password protected and all files were password protected.

4.7.2.6 Data Access

Only individuals directly involved in this study had access to any data regarding the participants. All information was password protected and the password was held by the principal investigator. The data was analysed by the principal investigator in secure environments and storage. All electronic personal data was held in an encrypted environment with the analysis being undertaken and transferred using participant identifiers only. Such transferred data was within password protected files. The principal investigator has preserved the confidentiality of participants in accordance with the Data Protection Act 1998. All data is anonymised before publishing and all participants will be referred to by their participant identification number (Px). The data has been stored and accessed during the study and will continue for a maximum of 12 months after submission of the write-up. Interviewees remain entitled to withdraw consent throughout the study and to have all data deleted and destroyed.

4.7.2.7 Study variables

No special equipment was required for the research other than recording Dictaphone.

4.7.2.8 Validation of Case Study research

Yin (2009) outlines four commonly used tests to establish the quality of any empirical social research being construct validity, internal validity, external validity and reliability. In the context of this study the following techniques were utilised. Construct validity was ensured by the use of multiple sources of evidence which through interview transcripts and observation notes produced a chain of evidence in the data collection phase. Internal validity was maintained by within-case analysis and cross checking of results during the data analysis stage. External validity was ensured through provision of clear definition of scope and boundaries in the research design supplemented by comparison with the extant literature in the chapter six conclusions thus assisting with the identification of contributions to knowledge. Reliability of the case study process was ensured by following the case study protocol to make sure of a consistency in the collection of all case study material and the subsequent analysis of results.

4.7.2.9 Case Study questions

The key element of the research was to set out in the protocol a set of research questions reflecting the inquiry and given the known environment surrounding alignment of ICT and the NHS Wales service a set of semi-structured open ended questions was designed in order to explore the participants understanding and exploration of the issues.

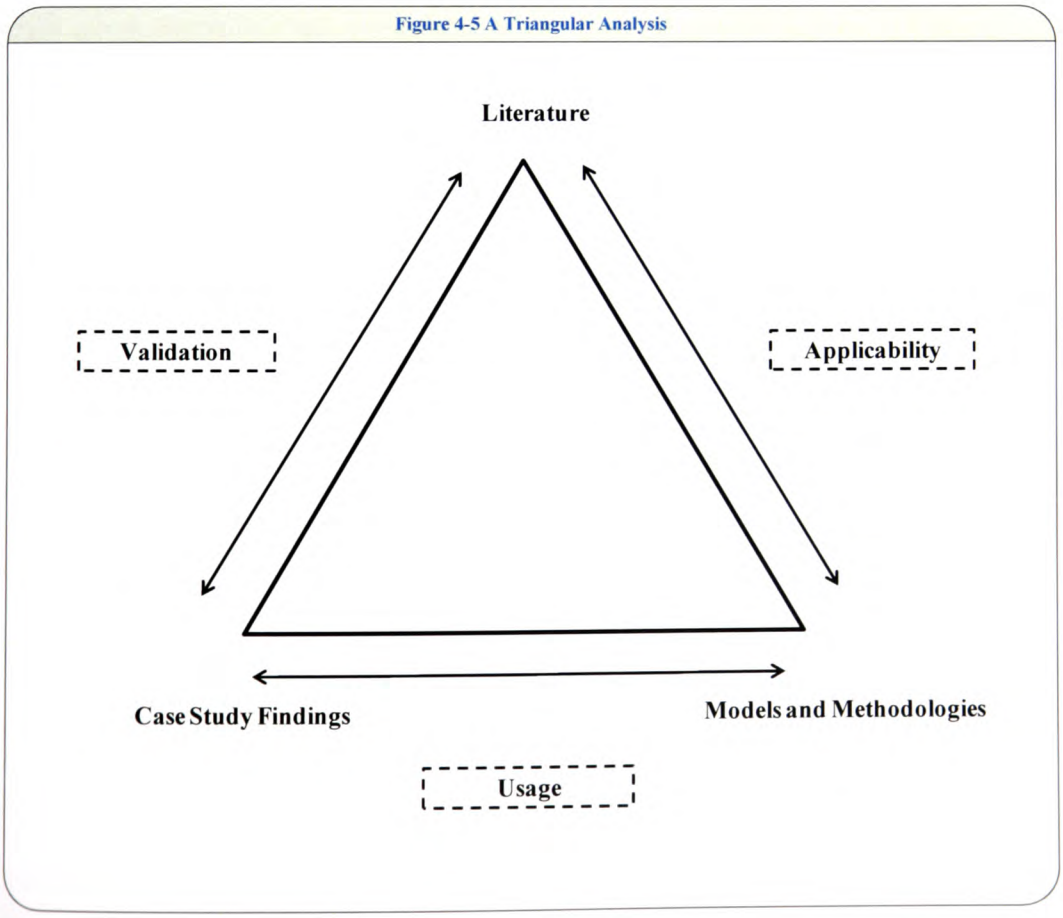
These questions were used as prompts for each case study and the areas of interview are set out in Appendix F.

4.7.2.10 Case Study Report

The concluding section of the case study design was to set out the structure of a case study report. In a single-case study, the challenge of presenting rich qualitative data can be

addressed by simply presenting a relative complete rendering of the story within the text (Eisenhardt and Graebner, 2007) and therefore the final report was structured into the research objective headings and utilised a narrative of the synthesised data supplemented by quotations from the participants. Each research objective provided an indication and guide towards the final content of the study which was to differentiate the findings from the research in order to analyse three areas being: the extant literature reviewed from the area; the available models and methodologies; and the case study. This gave the opportunity to undertake three phases of comparison: firstly, an analysis of literature with available models (model and methodology applicability); secondly, an analysis of models and methodologies with the case study findings (model and methodology usage); and thirdly, an analysis of literature with the case study findings (literature issues validation). This is encapsulated in Figure 4-5.

Figure 4-5 A Triangular Analysis



Identifiable personal data was not published in the results and it is the intention to publish the findings as part of DBA submission which will be placed in University of South Wales library. The opportunity to provide a presentation will be made available to participants.

4.8 Conducting the study

The case study was undertaken in accordance with the procedures outlined in the protocol and the details are set out in the following sections:

4.8.1 Permissions

The assembling of the information was a considerable task in itself and an extended length of time was required to seek permissions and authorisation from within the specific areas of the organisation where the research was proposed, an NHS Site Specific Information (SSI) form, which also contains approval from IG and line managers. In addition, the links between the sponsoring academic organisation has to be firmly established including evidence of indemnity insurance for the work undertaken by the research student (Principal Investigator). The full list of documents to be submitted is set out in Appendix E. The research was registered on the Betsi Cadwaladr University Health Board's research database. Following approval from the Ethics and R&D committees the research was to be undertaken over an estimated six month period which was based on an indication provided by the committee's lead manager in consultation days and review of other plans within successful approvals. This included time for planning, recruitment, data collection (inc interviews), analysis and time to write up any conclusions. Table 4-1 sets out the anticipated sequence of events which were requested under the approval process covering the compilation of the application data alongside signed declarations by the University over the research supervision and indemnities. This first phase took considerably longer than planned and was compounded by

the post approval steps (Stage 1-4) where access to busy and committed professionals did extend the interview and data collection period. The analysis and write up (Stages 5-6) were also extended although this was recognised, belatedly, as a much more challenging and iterative process than predicted in the original plan.

Table 4.1 Study Stages

Phase	Actions	Month Activity Completed
Planning		
	Sequence of events and resource requirements	**One**
Permissions		
	Completion and submission of request	**One**
	Approval to proceed obtained	**Three**
Study Procedures		
	Stage 1 - Historical context interviews and observation of research area	**Four**
	Stage 2 –Initial documentation review	**Four**
	Stage 3 – Interviews with individuals to gain detailed perspectives	**Five**
	Stage 4 – Comprehensive review of document and archival records	**Five**
	Stage 5 – Analysis of interviews, documents and archival records	**Eight**
	Stage 6 – Write up of analysis and conclusions	**Nine**

4.8.2 Identify and Interview Key Participants

One of the most important sources of case study information was the interviews, in the form of guided conversations rather than structured queries. Requests to interview were made through the CAS and background data and participant information was obtained. This was supplemented by approval in principle to obtain access to key staff members and data. The inclusion and exclusion criteria were used to triangulate appropriate individuals to be approached.

The identified participants are set out in Table 4.2 .The teams involved in the successful development of the solution came from a number of backgrounds and in generic terms could be described as: scientists; engineers; audiologists (Consultant, Adult Rehabilitation, Paediatric, Cochlear Implant); IT Technicians; Administrative Staff. In addition from the supplier side were Software Engineers and Programmers. The interviews were conducted predominantly upon NHS Wales's premises in North Wales where rooms were booked and recorded. Consent was received from the participants (Appendix G) and arrangements made to undertake the research through interviews arranged for seven participants. The first interview took place in November 2011 and continued through to June 2012. All interviews were recorded and subsequently transcribed. They were located, with two exceptions, in office locations with the recording removed to a safe location. The two exceptions were firstly the initial interview which was undertaken in a corner section in a purportedly quiet café location and the second over an audio telephone link. The initial interview highlighted the need for quiet locations to assist in the recording where microphone technology does not have the ability to restrict the background noise making transcription challenging. Other than the environment little change was required to subsequent interviews following the inital with the structure and range being confirmed as suitable for the purpose. Each of these individually made a difference with their contribution collectively providing a span of different aspects. These are summarised in Table 4.2.

Table 4.2 Contribution to Analysis, Design, Development and Implementation Areas

Participant Reference	Contribution Areas	Date of interview	Length of Interview
P1	Supplier -Listening to requirements, responding requests, developing, delivering & supporting software	9/11/11	45mins
P2	Leadership, vision, political connections (local and national),	14/02/12	41mins

	bottom up understanding, implementation, clinical champion (perceived by others), technology skills (and practical intervention), communicate (inc language), balanced risk taking, professional clinical competence (e.g. set up of hearing aids)		
P3	Design, Process. User interface, flow, change, documentation, managing uncertainty, Influencing product	12/03/12	26mins
P4	Implementation, Train/teach, problem solving, reporting, Network, Influencing product	03/05/12	44mins
P5	Bottom up understanding, administrative processes, user interface design, Influencing product	29/05/12	54mins
P6	Procurement, project management, Influencing product	13/06/12	39mins
P7	Testing, problem solving, communication, supplier interaction, train/teach, back up support, Influencing product	20/06/12	53mins
		(Average length)	(43 mins)

This clearly demonstrates that a number of diverse individuals all contributed to the end solution over many life cycle stages.

4.8.3 Data Elements

During the interview, requests were made for copies of documentation or lessons learnt from the product development and deployment. It was evident early on that minimal documentation was undertaken and what little which had existed were broadly unintelligible email trails concerning elements of programming code. It was proffered that this was all taking place at the cusp of when emails and computers were becoming available in some areas of the Health Board. After further investigation by the participants it was confirmed that any personal notes taken at the time had not been kept and were no longer available.

Following the initial discussions the CAS was also contacted to release data for analysis. This was to include his copies of documentation or archival records that were still available or end of project reports such as lessons learnt. Consistent with the other participants and due to the period of time elapsing since the initial deployment of the product, minimal documentation existed within the archives.

4.8.4 Observation

In this study a visit, by arrangement, to the audiology departments was undertaken to assess the types of behaviour when using the software, environmental conditions it was being used in, locations of its use, integrated workflow it was part of, the ease or complexity of its use, the training requirement and operational procedures which underpin the day to day operation.

4.9 Analysis Section

The interviews were transcribed and saved securely. The principal investigator and thesis author undertook the analysis. This was informed by the literature review and the research objectives identified (Deming, 1986, Mintzberg, 1987, Parker et al., 1988, Neave, 1990, MacDonald, 1991, Niederman et al., 1991, Baets, 1992, Powell, 1992, Broadbent and Weill, 1993, Deming, 1993, Henderson and Venkatraman, 1993, Norden, 1993, Baets, 1996, Coakley et al., 1996, Burn, 1997, Ciborra, 1997, Gunn, 1997, Hillmer and Karney, 1997, Labovitz and Rosansky, 1997, Baets and Galliers, 1998, Brown and Magill, 1998, Hsiao and Ormerod, 1998, Papp, 1999, Maes et al., 2000, Venkatraman, 2000, Rondinelli et al., 2001, Smaczny, 2001, Jackson, 2003, Avison et al., 2004, Galliers, 2004, Goldratt and Cox, 2004, McNulty and Ferlie, 2004, Leach, 2005, Peak et al., 2005, Seddon, 2005, Bhatia and Drew, 2006, Seddon and Caulkin, 2007, Radnor and Walley, 2008, Seddon, 2008, Zokaei et al., 2010). The understanding of alignment was considered across multiple factors and in analysing the data a thematic coding approach was undertaken having ensured that such an

analysis is consistent with the theoretical propositions underpinning the research questions. This required immersion in the data collected by repeated reading of interview transcripts, documents and archival data in order to compare and contrast points to draw out significant findings. The initial approach in each interview was to identify points which had come from the participants and this was collected initially as key words and therefore themes using a mind mapping approach on paper. As these strands began to emerge from the interview transcriptions it became possible to create a foundation for further analysis and these were further normalised into a coding structure which is presented in Appendix P-1. This coding structure formed the basis around which the transcriptions were input into a computer program to facilitate analysis. The computer program used was NVivo which facilitates the manipulation of qualitative data through coding of units of data into nodes. This allows the data to be reorganised to allow all responses across a number of interviews to be linked and presented to each structured question, in this case, the research objectives. After the coding structure nodes had been entered into NVivo the transcriptions were systematically reviewed and the data allocated to nodes with any subsequent emerging codes being retrospectively applied to the relevant NVivo coding. The final stage undertaken in the software was to produce a coding summary report based around the coded nodes with an example being presented in Appendix P-2. This report, although correct in its analysis and presentation, was felt to be rather difficult to manipulate further unless the user was very familiar with this software on a regular basis. This completed an initial analytic manipulation as described by Miles and Huberman (1994). To summarise, the transcription and further coding exercises were labour intensive and time consuming but gave additional insight from the data in preparation for the mapping back to the research objectives.

However the outputs from the software assistance did not satisfactorily address any of the theoretical propositions stemming from the how and why questions (Yin, 2009) in this

format. Although potentially possible to apply the headings against the six research objectives highlighted earlier in chapter three (3.11) the decision was taken to undertake this outside of any computerised analysis tool due to the researchers limited knowledge of the complexities that Nvivo manipulations require of the user. The coded data were exported from the NVivo solution under their structured headings into a standard note taking package whereby the key codes were aligned with the six research objectives. This resulted in an element of duplication across the objectives which were addressed through further analysis utilising the one sheet of paper (OSOP) approach. After several further protracted iterations the shape of the key factors for each objective began to emerge from the data. This subsequently led to the next analysis step which was to revisit the transcripts and pull through the relative factors and quotations. Further normalisation was introduced into the analysis and reflection which resulted in additional relevant quotations being identified and added to the now substantial detail of structured data. In anticipation of the later stages of the study the final decision was to produce a structure for each objective where the findings reflected some of the conclusions of authors identified in the literature research. This assisted in chapter six when comparing and contrasting the data with previous reported evidence in the literature. Having structured the data and outlined the presentation parameters the case report was then written to outline the emerging factors, supported by selected quotations, with the findings set out in chapter five.

4.10 Confidentiality and Ethics

This section considered the issues of confidentiality and ethics and any potential impact upon this thesis. As indicated earlier in the field procedures (4.7.2) the issue of confidentiality and ethics underpin the study methodologies. Miles and Hubermann (1994), Gill and Johnson (1997) and Cooper and Schindler (2003) identify ethical issues such as preserving

participant's anonymity, not causing stress or asking questions detrimental to self interest, avoiding deception or coercion or involving individuals in research without their consent. Confidentiality was defined by Sieber (1992) as agreements with a person or organisation about what will and will not be done with their data (including legal constraints). Appropriate standards of confidentiality and ethics were applied during the study (Saunders et al., 2006) supported by the following approach.

Overall the information was not patient related and focuses on individual's recollections, beliefs and interpretation of events. In anticipation of concerns raised the following ethical statement was drawn up to be used as part of the access arrangements. All participants in the study were assured that their participation was purely voluntary. It was made expressly clear, in the initial invitation to participate, that although the researcher was a manager in their organisation it did not mean that this request came from the organisational management. The researcher ensured that all participants recognise that this was a piece of personal research being undertaken in an individual capacity. The material obtained through the surveys undertaken in this research was held confidentially. No data was directly attributable to the person surveyed either in the project report or in any correspondence or face to face contact between the researcher and the organisation which employs the interviewees. To respect the autonomy of those providing data, the survey interview transcripts were only accessible to the researcher, the supervision team and those who will assess the DBA. Only anonymous extracts and summaries of the data were included in the main body of the DBA or in any material to be used within the public domain (e.g. conference papers and discussions in the research community). All respondents had the right to request access to the recordings, transcripts and notes which relate to their individual contribution to the research including their completed questionnaires. All data was stored in a secure location in the researcher's

home and office and the data will be destroyed following completion of the assessment process of the study.

4.11 Summary of the methodological issues in the Research Domain

This chapter has explained the methodology for undertaking the research in response to the study research question in chapter two and the research objectives in chapter three.

- The overall methodology is one based on a phenomenological philosophy which uses qualitative methods
- It employs a longitudinal case study as the primary research strategy.
- An appropriate area was identified which demonstrated alignment success
- The research design was concluded with production of a research protocol.
- Gaining permission to undertake the study was a protracted exercise which extended the anticipated timelines.
- The participants for interview were identified after further contextual review of the case study area
- Following approval the principal investigator was able to undertake the interviews with participants from the department.
- The interviews were transcribed, coded initially with Nvivo software with considerable additional OSOP analysis undertaken until the key themes emerged.

The findings are presented in chapter five and the analysis in chapter six.

Chapter 5- Case study findings

5.1 Consideration of findings

Chapter five provided a focused consideration of findings around alignment within the design, development, deployment and ongoing use of the Auditbase solution. This chapter undertook a longitudinal case study to consider the areas of enquiries set out in chapter three and embodied within the research methodology and protocol in chapter four. The issues explored within the case study provided rich qualitative evidence to address the areas of enquiry formulated to answer the aims of the thesis. The structure of this chapter commenced with an overview of the participants within this study. The case study was contrasted against the themes identified in Chapter two, the literature in Chapter three and undertaken in line with the research methodology in Chapter four.

5.2 Overview of Audiology Project Timescales

The development of the Audiology solution came from an initial concept by a Norwegian doctor. It was developed first for Scandinavia and subsequently re-developed for the specific requirements of the UK health market, resulting in the widespread adoption in England and Wales, which took place over a 14 year period. Table 5.1 sets out the key elements of this timeline.

Table 5.1 Timeline of inception, development and implementation of Auditbase

Stage	Activity	Year
Initial Concept	White paper written by Norwegian doctor	1991
Development	Danish company commences joint venture development	1991
Live System	First installation in Denmark	1992
Live System	First installation in Sweden	1993
UK Link	CAS first sees system and agrees to advise on the build for UK	1993
Beta Site UK	First centre in UK – St Asaph, North Wales	1995
North Wales Sites	Departments in other DGH's take system	2000
Additional UK sites	Only 3 sites take system in UK – pending National Initiative	1998-2000

MHAS launched and implemented	Modernising Hearing Aid Services	2000-2005
MASW launched and implemented	Modernising Audiology Services Wales	2002
Change of ownership	Original entrepreneur sells company	2001
Change of ownership	Original entrepreneur buys back company	2006

5.3 Overview of Audiology Process

The audiology system has a wide yet integrated set of functionalities enabling the processes which serve patients in their request, appointments, hearing aid testing, appliance ordering and fitting. Underpinning this patient service is a robust scheduling, tracking and extensive set of data which supports comprehensive demand and performance management. These processes are set out in Appendix H.

5.4 Overview of participants

The teams involved in the successful development of the solution came from a number of backgrounds and in generic terms could be described as: clinical scientists, engineers, audiologists, IT technicians, and administrative staff. In addition, access was made available to the supplier owner. Each of these individually made a difference with their contribution collectively providing a span over different aspects. These are summarised in Table 4.2. This clearly demonstrated that a number of diverse individuals all contributed to the end solution over many life cycle stages. The participants were then interviewed over their experiences in accordance with the areas of enquiry which are reported in the following sections.

5.5 To assess what influences national policies and strategies have upon alignment of ICT and the NHS Wales – RO1

This objective considered and contrasted the influence that national directives had upon ICT within the case study context. The main themes are presented in Figure 5.1.

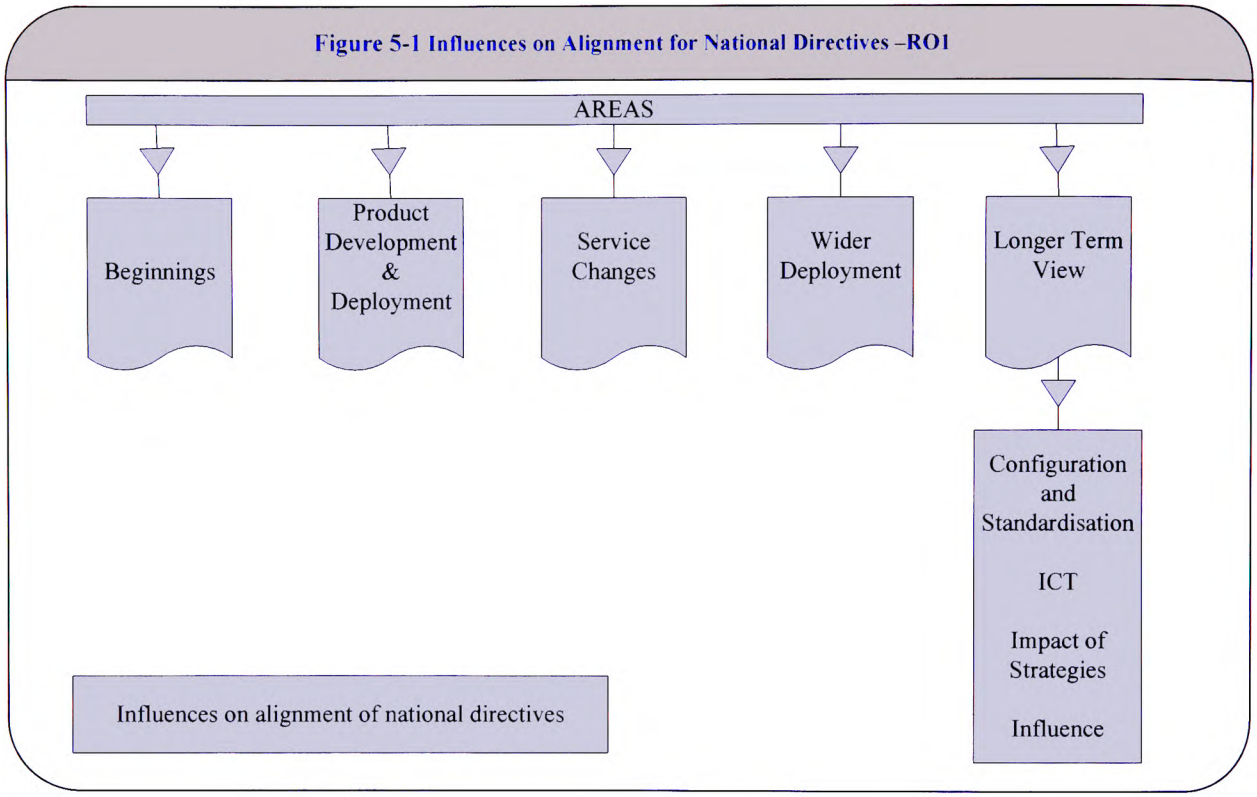


Figure 5-1 Influences on Alignment for National Directives –RO1

5.5.1 Beginnings

The Consultant Audiological Scientist (CAS) who was also a departmental manager was 'touting around' at conferences the idea of a workload management type system with some capturing of the principal dataset in hearing (P2) and happened across an individual who was attending the conference on one of the stands, aside from the main exhibit, and was demonstrating a small database (P2). The company that actually had the main stand was the largest hearing aid and supplier of UK departments. They were keen to start to use computers which were just beginning to appear in instrumentations and was why they had taken the opportunity to secure the individual (P2). They had a number of meetings facilitated by the company (PCWorth) and met with the director of the company Auditdata which owned the product auditbase (P2). As a next step, the CAS and a colleague went over to Copenhagen to

examine the product being used there in the Danish health system which was their equivalent of NHS Wales (P5). However, they were only using it for recording clinical patient details and not to record the details of the hearing aid fitting (P5). Following various meetings, the main supplier who introduced the parties to each other, started to get 'cold feet' about getting into software development as they didn't have any expertise and the realisation that it was a much 'bigger deal' than they had originally thought led them to subsequently back out. This left Auditdata, the company, in direct contact with the hospital (P2) and gave the team a potential opportunity to work with a small specialist software company to develop a product which was, as yet, more visionary than specific (P2). In conversations it was identified that although the backend database structure itself was what was required, the user facing front-end was not appropriate. The hospital team knew they could adapt that and therefore made an offer to the supplier to come and try the software out in an NHS public hospital, with the department acting as demonstrator, providing effort into sharing (telling) the company how it should look and feel for users (P2).

This initial interaction with suppliers was not based on any formal strategy at a local or national level. It was largely driven by opportunistic enquiries and networking within the profession seeking out innovation at the beginning of a period of change in the audiology environment.

5.5.2 Product Development and Deployment

The department took the proposal to the executives and used the current income generation environment at that time to seek backing for their venture (P2). Putting on a major roadshow to demonstrate its potential to other audiology departments they set out a proposal that the solution would be available in one year after making sure it was commercially ready which stimulated huge interest and for significant numbers of people to say they were going to buy it. However, England announced that they were going to modernise (audiology) services and

all interest stopped with individuals stating "why should we buy it when probably it will be bought as part of some national programme" (P2).

> *" ...was a tricky period for about two years where they (Supplier and Hospital) thought after all the effort had been put in, the company had put a lot of investment in ... and it didn't look like as if it was going to sell "(P2).*

Reflecting on events demonstrated that for a period of time the supplier sold the odd one and two but nowhere near what they should have expected due to the political climate getting in the way of service and business development (P2).

This is an example of where the suggestion of a strategy being announced had a big effect upon local innovation. Although the strategy details, in this case externally in England, were not clear it was sufficient to suppress any further procurement expansion of the auditbase solution.

5.5.3 Service Changes

During the later stages of this period, details began to emerge of wider service changes in the UK and it was announced digital hearing aids were to be issued in England (P7). To facilitate this England set up NHS Modernising Hearing Aid Services (MHAS) whilst Wales initiated Modernising Audiology Services Wales (MASW) which had, as a large component, an objective to introduce digital hearing aids (P4, P7).

> *"it's what drove MHAS in England ..it's what drove their MASW in Wales really.. it was the wish to provide digital hearing aids because the sort of off the shelf NHS provision of hearing aids had been really stagnant for a long time" (P4).*

Its objectives were for patient management systems to streamline the care process and enable up to date accurate information to be available for service delivery (MRC Hearing &

Communication Group, 2013). However, in England their MHAS proposal stalled as they had been unable to get a consensus English view about how to move forward (P2). In terms of the software to support digital hearing aids it was much harder to get agreement to go out to tender for one system because there were so many more services in England (P3). Whilst in Wales the environment was slightly easier in that:

> *"in Wales we (the hospital) were very much a trailblazer in doing this nobody else was doing it so we had almost a free rein to carry on and do this. In Wales there was an easier political climate to convince government officials and politicians that we needed investment in audiology so we had a program called modernising audiology services Wales which basically set up services and departments to be able to issue digital hearing aids and as part of that programme there was a software procurement for audiology patient management systems to enable us to program hearing aids" (P2).*

This was partly unique at that time in that the strategy included varying components which included improvements to service, equipment to deliver that service, environment used by audiology departments and support for the staff through additional training. The final requirement was a computer system to underpin the whole service. This was widely appreciated within the professional environment

> *"that for all of Wales we had the MASW... modernising all Wales service .... as well as having a ..newer fabric buildings and what have you ...upgraded of buildings... that's when it was decided that all of Wales would have audit base as their system" (P7).*

The impact of national strategy began to leverage the patient benefits brought about by the issue and support of digital hearing aids. In other strategies this may have caused difficulties with the appliance technology outpacing any development of IS but in Wales this was not the case. The adoption of a more standardised approach was as a direct impact of the strategic

initiative although the underlying computer IS was almost not available due to the lag between the development of product and the delay before the initiative. There was also a clear link between the service change and the underlying benefits of the IS within the initiative.

5.5.4 Wider Deployment

The initiatives impacted upon the products presence within the UK emerging from initially, odd little flurries of initiative but nothing English centric, to the Welsh procurement happening which was a big boost, followed very soon afterwards by England coming out and buying it which led .....to an almost boom economy where they could not implement it fast enough and so many people wanted it (P2). The initiative in Wales was well received.

> *" it made them feel much more up-to-date.... I think there is a definite buzz round the time.. ... we got the database, we got audit base and then shortly after... we actually got proper money to enable us to fit everyone with digital hearing aids ...so it was a real ....you know this is the modern age ...." (P4).*

Once the details of the strategy emerged, progress was rapid with national procurements being co-ordinated and successfully finding a supplier who was now under pressure to deliver having had a period of limited success. This also suggests that strategies have an ability to create huge stop/ go waves in the innovation and product cycles.

5.5.5 Longer Term View

The interviews invoked reflection over the period and a number of issues emerge from the findings which had a strategy influence.

5.5.5.1 Configuration and Standardisation

Participants drew attention to lessons learnt in hindsight over reductions in variation between configuration and implementation of the solutions.

"the English modernisation and the Welsh modernisation missed out when they specified a system they didn't define ..a dataset that ...a standard dataset that couldn't be modified you know .. like the top 10 procedures or something" (P4).

The influence could have been greater in the areas of standardisation where installations of the product were slightly different due to a large part by the products configurability and the suppliers enthusiasm to give clients what they wanted.

5.5.5.2 ICT

The IS developed in the absence of any national IM&T or ICT Strategies. This has created anomalies between pre-existing systems and the framework set out by newer ICT architectures.

"that those strategies are flawed in terms of departmental type systems because I think it should be an interface type strategy but ..we are into single solutions, big solutions, and I don't think that is going to work so much for the very bespoke technical aspects that you need within software" (P2).

This leads to debates over the most effective way forward i.e. enterprise wide solutions versus integrated approaches. Another legacy system has been developed in therapies, which was a very similar development, is also caught by the fact that it's not perfectly aligned with the IS of England or Wales (P2). In view of the chequered history of national approaches there exists a shortfall of evidence around alignment with further work required in this area.

5.5.5.3 Post deployment impact of strategies

Other service change initiatives, over time, have included a whole patient pathway approach to service delivery targets. In Wales, this included the Referral to Treatment Time (RTT) requiring further integration into a minimum data set collected over multiple systems to calculate and publish performance target information (P7). The audiology solution is no

exception to this and required adaptation of its data sets and process flows. This has skewed development away from the 'flow' and operational data towards the performance management agenda. In England the advent of payment by results is beginning to change the nature of the way previously networking departments worked together.

> *"in England, sites that are next door to each that are other possibly all competing for the same work ...which then possibly may mean that they are a little bit less likely to want to communicate with each other about what they want and how they want things for them to develop... you (also) have ...any qualified provider ..... so obviously in England you've got a lot of sites where the audiology department is almost if you like being put out to tender, so you can use anybody who is qualified to provide" (P7).*

It remains to be seen what the long term effect of this 'competition' approach will have upon the future alignment of service and technology.

5.5.5.4 Influence on personal behaviour

However over time not all actions have been influenced by national strategies as one participant stated:

> *"as I had only been in audiology a short time because I had come from medical physics before that so I wasn't really aware of the national perspective at all on it at that time....it was just a piece of work I was tunnelled into doing" (P3).*

5.5.6 Importance of Findings to Research Questions – RO1

The product was a success within North Wales leading to what is varyingly described in the literature as IT effectiveness, superior business performance and harmony between activity and IS that support them. The evidence suggests that:

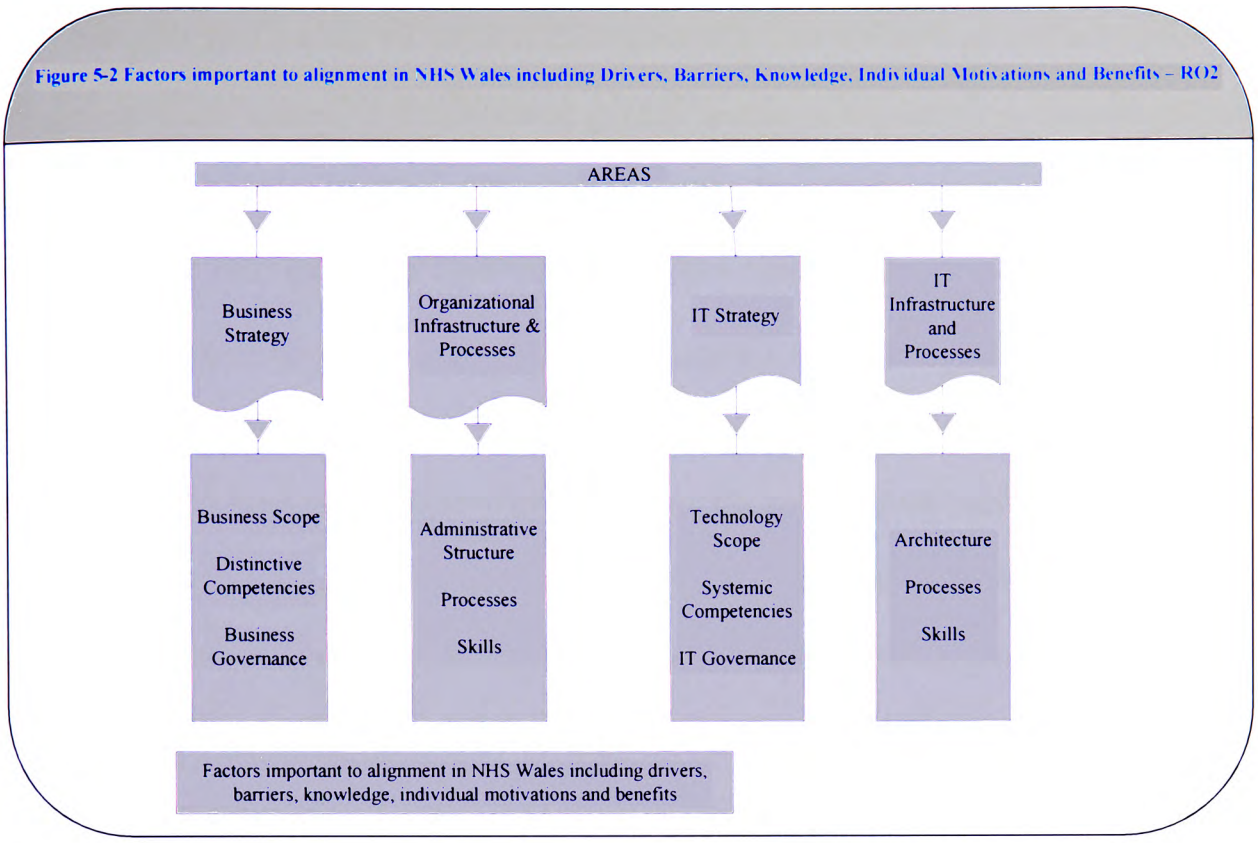
- the setting of a cohesive approach embracing a number of components can assist at some stage of a service development objective
- it appears that strategies had minimal influence upon original innovation and development of IS products
- wider announcements of strategy made later almost derailed the innovation by:
    - cutting the demand stream for suppliers
    - almost overwhelming them as the artificially created dam of demand was released.
- some characteristics of a traditional approach to strategy formulation existed in it that it was based, as a package, around the considerations of:
    - services to be provided
    - equipment provision (digital hearing aids)
    - patient environment
    - staff training
    - IS
- the close working nature of audiology within Wales may have had a more significant bearing than previously acknowledged as a result of:
    - there being an effective network in Wales generally around the scientific advisory mechanism for WG
    - having an audiology standing specialist advisory group (P3).
- avoided a consistent fault in other strategic initiatives where no product is 'ready' at the time of announcement and where frantic development cycles are then initiated by suppliers although the availability of the IS part was 'luck' (P1)
- strategies from other domains were:
    - having an increasing effect upon continuation of effective alignment

- challenging the existing premise which has been successful to date at a patient flow level
- raise questions as to whether the absence of other strategies were an enabler
- too prescriptive by focussing on the methods rather than the objectives (e.g. ICT Strategy).

- influences over time have to some extent eroded the initial impact of alignment by:
  - challenging the current approach (ICT national strategy)
  - diverted development (performance strategy)
  - has the potential to fragment any future alignment improvements (payment by results and internal competition).

5.6 To identify factors important to alignment in NHS Wales including Drivers, Barriers, Knowledge, Individual Motivation and Beliefs – RO2

This objective considered the factors important to alignment within the case study context. The main themes are presented in Figure 5.2. The structure of the themes emerging is based around the relationships that exist among the 12 components of SAM (Henderson and Venkatraman, 1990, 1993) expressed by Luftman et al. (1999) which was presented in Table 3.1 in chapter three. Not all of these headings are applicable within a public sector environment but the model still provides a useful framework to consider those aspects of alignment evident within the research area.



5.6.1 Business Strategy (I) - Business Scope

At a global hearing aid industry level the alignment was being redefined and influenced by a number of factors: to use the modern devices you had to be able to record the settings in the hearing aid; needed to electronically program the hearing aid because it was physically impossible with the number of settings you could do to use screwdrivers and trim pots; and it had to be done by a computer (P2).

> *"the world global situation at that stage was hearing aids were just starting to get more complex than simple analog amplifiers and there were various settings you could attribute to a hearing aid that 20 years before that you couldn't..." (P2).*

This led to the conclusion that you couldn't use them in any meaningful way unless you had a database to record each individual client's settings. As an industry they had never used databases in this way, were not willing yet were being taken in this direction (P2). As would be expected the provision of hearing aids to the NHS patient brought a huge upheaval in

audiology because as a service they had bought off contract for quite a long time and were halfway between a digital and an analog hearing device which in essence was a completely programmable analogue aid. As a result they were using personal computers (PC) in 95/96 doing some real in-ear measurements with patients to verify the fitting (P4). The reason for this was with the digital there was a huge amount of data that you would potentially want to record and that was never going to be possible with a paper-based system (P2). From a hospital point of view, the CAS was already beginning to consider the need for new ways of recording as a result of seeing something similar to what they were doing, knowing what was happening in the world of audiology, aware that things were changing and concluding that this seemed a good idea to have in the UK (P7). In addition, this took place when computers were just beginning to appear in instrumentations (P2) within an environment where PC's were a relatively new concept and not widely available although they had more computers than members of staff at a time when other departments had none (P2). Hearing aid suppliers (Hearing Instrument Manufacturer's Software Association - HIMSA) had to work together with a relatively common standard which used the NOAH standard as a method of compliance. NOAH is the "integration framework" that allows hearing instrument fitting, audiological measurement and office management systems to share a common database. NOAH provides a de facto standard for controlling the exchange of data between these applications and systems (AudiologyOnline, 2013). The office systems were therefore a key part of any future solution and they needed the software behind it to check the connections with Noah (P4).

5.6.1.1 Issues within business scope

The Business Scope and its complexity was a significant change both for suppliers and audiology departments. The move to digital hearing aids which had to be based upon databases was a significant shift at a time when PC's were not an established desktop item in

the workflow. Earlier in the findings, it was highlighted that suppliers were not confident in the new computer software environment. Therefore the normal way of working, current suppliers and current equipment were simultaneously in a period of change within which those who didn't conform would struggle to survive.

5.6.2 Business Strategy (I) - Distinctive Competencies

Luftman approached his work within the private sector world so a mapping exercise was always going to be a compromise when using the framework for a public sector analysis. Some components do translate well namely core competencies, product development, competitive environment, and to some extent a brand delivered through its national profile.

5.6.2.1 Core competencies

The CAS was acknowledged as somebody who knew a considerable amount regarding IM&T and was sought out for advice and to set a direction which meant that he was in a unique position to influence things quite heavily (P2). This was described as someone who sees it through, to the extreme, guiding things from the initial concept, dealing with the original people through to the beta sites (P7). Previously experience in software development had meant not only an understanding of databases but also commercial skills where in one previous project a development by the CAS was picked up by a company who then developed it as a piece of software that they then sold on to other hospitals. There were about 20 hospitals that used (his) stock control system (P2). This left him in good stead for when new opportunities arrived in this case study leading to an agreement, drawn up with the Director of Finance (DOF), for a profit share between the supplier and the hospital on sales in the first two years as well as receiving the product for a nominal sum (P2).

5.6.2.2 Product Development

The product was emerging at a time when technology in the office was desktop orientated with the larger corporate applications such as finance transitioning from terminal mainframes

to client server technology. As indicated earlier, the CAS had a reputation in delivering solutions which were at the developing edge of new available solutions and this was recognised by the Trust hospital, commercial partner company and more nationally across England and Wales.

5.6.2.3 Brand

At its inception the department had an identified persona of pushing the technological boundaries which was as a result of somebody to set a vision (P2). This in itself cascaded down within the department to build confidence and pride in the service provided:

> *"it looks a much more switched on sort of service when you're using something sophisticated" (P6)*

> *"so there was that buzz from... in the new accommodation.. in 1997.. we felt quite posh being in a nice new environment.. and then there was a buzz of the new database and then fully digital..I think staff felt very much more proud of the service than they ever had done before because they felt they were... that they had a truly scientific feel about the place instead of being a bit more sort of old-fashioned.. it just felt modern .. so I think that there was a ... very powerful... I think slightly underestimated by some people but a very powerful feeling, of you know, we're on the move, here's really ..we're cutting edge... we are providing a brilliant service" (P4).*

In turn this began to manifest itself outside of the boundaries of the hospital through raising the profile of the department as a UK demo site to make audit base a national audiological tool (P5). This has sustained since the case study period and into the future they describe themselves satisfied being very much self-contained, not part of the Ear Nose and Throat (ENT) speciality, masters of their own destiny to a certain point and in control of their service (P4).

5.6.2.4 Competitive Business Environment

In the period covered by the research and forward into the more recent past the audiology service in Wales has not been placed within a competitive environment. However in England more latterly this has changed and the competition factor will affect the strategic impact of the business as highlighted in the earlier section.

5.6.2.5 Monopoly

The environment and market place within which the supplier operates continues to restrict competition purely down the success of the solution and the limited ability of alternatives to compete.

> *"there's no doubt that the product, it has become ubiquitous and you know the second product I talked about .... is almost dying, there are so few departments using it, in fact departments have converted from it to auditbase, which is actually a problem now because they could become a monopoly supplier and that in itself is a danger (P2)"*

This has led to concerns that where companies have got market saturation they are then in a much stronger position having sold a system that they can't expand any more resulting in barriers to the ability, in realistic terms, to go and change to another system (P6). This demonstrates the benefits of 'first movers' which is well documented in the literature. Some participants drew attention to the longer term effects of such a position:

> *"audit base maybe would know that and be in ..... a strong position and that causes difficulties in terms of them moving the product on because they think well actually we've got you anyway so it becomes a bit of a cash cow for them rather than, you know, being motivated by the hunger of getting more business .... to give the customer what they want so they are in a dominant position really.... lack of competition...you do need a good number of potential suppliers and systems out there that can .... deliver" (P6).*

5.6.2.6 Issues within distinctive competencies

Having a well-placed political leader, who was active within Wales and locally in the hospital, demonstrated the importance of providing a visionary outlook linked to leadership qualities to have a profound impact on the solutions success. Supported by a mixed range of academically qualified scientists with audiology professionals provided a good insight into the possible and an outside in perspective which collectively brings a significantly wide range of key core competence. The CAS had a reputation in delivering solutions which were at the developing edge of new available solutions and this was recognised by the Trust Hospital, commercial partner company and more nationally across England and Wales. The hospital department became known within the UK as a leader in audiology IS and still has significant influence at a strategic level with its supplier as a strategic partner. The environment started off with a close working with supplier which has continued throughout the life cycle to date. This has been very successful. However some concerns have emerged, not evidenced, that this may begin to move towards a more monopolistic situation in the future.

5.6.3 Business Strategy (I) - Business Governance

The governance within NHS Wales has changed significantly over the last 15 years. Whilst initiatives were still a part of the day to day management process they were not as numerous or as restrictive as current practice. The analysis was able to identify elements within the governance which has significance.

5.6.3.1 Relationships

> *"we were a small community who knew each other, all of us, I knew every departmental head in Wales and I met them regularly and we met the chief scientific adviser and we met the procurement people when it was decided we were going to modernise audiology services"(P2).*

The CAS was already a nationally known scientist within audiology (P2, P5) who was also well connected politically through the network in Wales around the scientific advisory mechanism for Welsh government in the form of an audiology standing specialist advisory group (P3). He was in a position where he was able to do things without too many people stopping him or having to try and get time and get resources from local IM&T (P2). The participants referred to this less onerous control regime where access to people in senior positions was easier, a lack of business case type activity, unless deemed to be for big items (P3), with more emphasis upon track records on what was delivered in the service (P2). This was evident as development work was undertaken without asking for any permission from any authority body and contrasts with current regimes where to get funding and agreed time out, a process is followed resulting in requests being written up and a demonstration of benefits (P3). The emphasis has changed over time with current projects more concerned about how money is removed from departments without impacting on services (P2) and is a complete dichotomy from the previous local autonomy.

5.6.3.2 Government Regulations

The impact of Government regulations which were highlighted in Luftman's component were highlighted in the previous section. However, to summarise the impact it is clear that a direct line relationship existed from the hospital department through to what was the (then) WO and the (today) WG. The local interpretation of national regulations, and their resultant effect on local health responses, were less well defined and more fragmented even across North Wales, being subject to a less onerous scrutiny process, and therefore provided the opportunity for some manoeuvrability in their delivery.

5.6.3.3 Relationships and Alliances

> *"Once a year we invite key players across borders UK, Scandinavia and send them for a day or two to discuss not daily problems not problems but in the next two years what's going to happen"(P1).*

The CAS and the department team have had a close relationship over many years with the software supplier. At a strategic level this has included the CAS contributing to the horizon scanning exercises in conjunction with other professionals and the company. Co-operation and mutual confidence was evident at the early stages as they realised that if they were to make it to work anywhere then it was in the hospital department due to the number of people who were computer literate and keen to implement. This resulted in a software solution which was installed on day one as a trial, used 'in anger' to book clinics and never got switched off (P2) although other participants recalled that there was a significant amount of support after it was implemented (P5). This continued from the development through the production phase where, as reported earlier, the company found difficulty building on this initial successful product launch. In the opposite direction to support the supplier the Department actually assisted with implementations at other hospitals although part of that may have been driven by a pecuniary arrangement referred to in earlier sections. Other benefits came through the long term relationship in that the original hospital has full free licences and access to all the all modules and available functionality without any charge for this wider benefit (P7) and able to influence the development of the product over the long term. This unique influence changed as other users were taken on board by the supplier (P6). This relationship was two-way with good support from the company which enhanced this relationship and a participant related the difference in their experience of other suppliers who would challenge whether a particular issue actually exists particularly where difficult to prove

where the fault lies (P7). This is in contrast to the auditbase supplier who would listen and resolve the problems resulting in greater confidence (P7).

> *".... listen to the customers, always listen to the customers, and also react on what we hear is a very fundamental thing of running my business. I mean its old school but it works.... so we are listening to what they are saying (as) we visit sites.. we are on-site see what they are doing and we actually are implementing both small and major features that will help them in their daily work" (P1).*

Such actions built trust between the department and the supplier suggesting that a close relationship over an extended period of time had long term benefits to both the users and the suppliers.

5.6.3.4 Issues within business governance

The CAS had an established network which ensured he was known, had professional credibility and was able to act politically with a large number of influential stakeholders at local and national level. Without a tight business case process and imposed resource constraints hospitals and departments were also able to devote time to such developments and were more willing to accept risk when striving to achieve their objectives. Long term relationship were evident then and this has continued. The supplier has listened to the service and has responded. It is evident that the customer (department) has been an intelligent source for the company. The department has benefited from a large influence over the future direction of the product as well as access to licences and functionality far beyond the more regular commercial arrangements of other sites. Being involved as a test site has benefited both parties.

5.6.4 Summary of Key Findings- Business Strategy

The development came at a time of significant change within the audiology world which:

- required a significant change in the way of working
- coincided with the incidence of desktop and server type technology being deployed
- had availability of a motivated workforce with a wide range of skills
- saw a supplier themselves keen for success
- development led by a politically and professionally well connected CAS who had
    - a clear vision of the business strategy
    - knowledge of what was required to deliver this into a service environment
- commenced with a long term relationship and has continued throughout the life of the product
- developed initially in an environment not hampered by tight governance and resource constraints.

5.6.5 Organisational Infrastructure and Processes (II)

This section considers the capabilities of the department and organisation in terms of its structure, processes and skills.

5.6.6 Organisational Infrastructure and Processes (II) Administrative Structure

The way that a business organises itself and provides its services can demonstrate unique features and this is reviewed with reference to its operational approach and resource management. The vision of the CAS was to combine the effective services with an element of patient activity recording.

5.6.6.1 Organisational Approach

At the time of the introduction of the digital hearing aid and enabling database the service was provided through a department based in a large acute secondary care hospital. This required patients to attend the site to receive audiology services and this was replicated in the two other North Wales major centres based in the west (Bangor) and east (Wrexham). Responsibility for service delivery was given to a departmental head, the CAS, as well as

effective use and management of resources. The hospital(s) were in turn responsible to a North Wales Health Authority (NWHA) and the ultimately, at that time, the WAG. There were limited formal relationships between the centres although professional networks existed to be supplemented eventually as the software became more established in the form of auditbase user groups. This structural approach, unseen at the time, had a number of longer term issues as the NHS Wales evolved in that the different configurations had consequences. These include that although the same system was procured across Wales the configuration was around separate databases. Whilst this provided some flexibility this has caused to some extent difficulties due to individuals going in different directions and using the system in alternative ways (P6). As a result in recent times when the west, central and east departments were set to come together as one service the issues around: ownership over different time periods, use in different ways; more intensive use in some areas; using different elements, even different symbols; have all come to the fore (P4). This was later experienced in other sites across England where some sites having had a lot of money from MHAS to buy the system have ended up just using it as a 'shell' for the programming hearing aids whilst using hospital Patient Administration Systems (PAS) systems for bookings. This results in booking on one system and having to transfer data to another so that they can fit the hearing aids and as one participant described " *it's just a complete mess...*"(P4). The service delivered on the major sites was compatible with the local IT strategy around the networking infrastructure but as service priority changed at a national level to provide facilities nearer to the patient issues of performance on the wide area network (WAN) arose (P6) due to the system being very data intensive with 'to-ing and fro-ing' between the user client and the server when hearing aids are fitted which can result in a minor interruption in service quality of the network or not working at all (P4).

5.6.6.2 Resource management – budgets

Financial management at that time was developing away from the more corporate departments towards including clinicians into the management structure. The drive towards an appreciation of resources expended, evidence about efficiency and development funding all required an evidence base (P2).

> *"was a huge benefits suddenly having a single view being able to..... go along to finance meeting where you have got a really good appreciation of your resources and what you're using , and evidence about efficiency made life a lot easier for me discussing developments and extra resources because I was able to evidence base a lot of what I was saying" (P2).*

With access to considerable details over activity, staffing and aid equipment there was a direct benefit in assisting with the resource allocation process.

5.6.6.3 Issues within administrative structure

The initial development of the product fitted well with the organisational approach at that time. Replication in centres across North Wales was also successful although elements of fragmentation remained hidden until service changes in the form of changes in the location of service provision and horizontal organisational convergence became priorities. This was not helped by developments in IT infrastructure lagging behind service delivery needs. A climate of increasing responsibility for resources was beginning to permeate into the clinical operations and management which drove a need for evidence within negotiations at a management team level.

5.6.7 Organisational Infrastructure and Processes (II) Processes

The flow of work within the department was another key consideration within the CAS vision.

5.6.7.1 Managing Complexity

The earlier sections outlined the step change that was underway within the provision of audiology services.

> *"very technology driven and ....other services might use it for patient administration... some might use it for .. measurements of conditions and imaging ...others might use it for interventions ... but we are using all of those and for stock control as well "(P6).*

The major components at a process level included the digital hearing aid being fitted for patients whilst linking hearing test equipment through to the hearing aid manufacturers and storing the details in a bespoke computer database (P6). This in itself was part of the overall increasingly complex workflow within each department that underpinned the day to day patient pathway facilitating appointments, working out what hearing aid to give to a patient based on its frequency, using an algorithm to arrive at the decision (P2), ordering, generating resource and performance data for management. This avoided a mixed economy through having one foot in the camp of technology and IT whilst the other foot still had to try and run paper records (P6). In terms of physical environments to be considered each centre had a number of facilities including sound proofed rooms for hearing tests and more advanced investigations, outpatient follow ups as well as walk in facilities for running repairs to hearing aids.

5.6.7.2 Value added activities and process improvement

The significant impact as a result in use of technology linked to the auditbase software brought about process improvement in a number of areas and had a significant impact on a range of stakeholders.

> *"you need audit base to see the patient ...anything we do with the patient you've got to use audit base ..some part of it or other ..whether your fitting a hearing aid .. or*

whether you're taking a history or booking an appointment ... audit base is the place to go and that's it .....there's no alternative so clinicians and our support staff... it's just... it is audiology, you know, it's.. it's the service ...it's the job...it's how you interface" (P4).

At a higher level of analysis, several participants were keen to stress the benefits to the flow and integration with the work processes. This included: having everything in one place, everything integrated including diaries; ability to look and see what have is planned for today, tomorrow, next week (P4). Others highlighted the real value of integration rather than piecemeal approach to: the measurement of hearing loss, physiological measurements which are recorded on the computer; stock control for ear moulds and hearing aids; the independence from paper (P6); making the work flow more easily (P7) and being 'slicker' (P4). One of the missed opportunities, expressed in hindsight, was the absence of a link to the PAS requiring new patient's details to be manually entered into auditbase (P4).

5.6.7.3 Identified Benefits

Working through the patient pathway it is evident that the solution brought benefits at most points. The following sections consider some of those areas in more detail.

5.6.7.4 Patient Data

Access to patient data is a key part of the clinicians clinical review process in preparation for outpatient clinic attendances but also an ability to have a bigger picture level in terms of looking at groups of patients (P6).

"I mean even today I did my clinic this morning and I looked at all the case notes in my office and I am nowhere near audiology I was able to look at all the notes and so was the colleague who was working with me who is perhaps 800 yards away from here, they were looking at the same set of notes that I was before we went into the clinic ... I

mean.. it's just liberating. I don't know how people work without it to be honest, but most clinicians do" (P2).

Some of the benefits described, although relatively mundane, were significant improvements like not having to find case notes for all the patients you were going to see that day or that they were missing, or in somebody else's office (P2), misfiled (P7), incomplete (P4), whilst being in with a patient with a live view of their record was a huge improvement (P2). It also combined the hearing aid data with the patient's record enabling the clinician to see where they've been, what's happened to them, what devices they've had all collected into one rather than relying on A4 index cards (P4), notes and bits of paper (P7) to keep track of what was going on with the patient (P4). Auditbase brought a reality to long held visions of having data at the fingertips of the clinician.

5.6.7.5 Waiting Lists

With the demand for appointments outstripping the capacity available within the department the shortfall is managed through the creation of waiting lists.

"Managing waiting lists- a lot of countries don't understand waiting lists but in the NHS we have waiting lists and being able to manage those in systematic, structured way was also fantastic benefit... I could look and see how many patients we have waiting for various things whereas before I would ask for lists of those things and people will go and get piles cards and say there are these many cards waiting for x and there is in somebody else's draw another pile, we'll go and find them, it was a mess in terms of understanding capacity and demand" (P2).

This ensures that an equitable process is undertaken in the allocation of appointments and has become, politically, a significant issue for governments within the UK. Managers within the

department were able to accomplish their accountability arrangements in an effective and evidence based manner using the data and reporting tools within the solution.

5.6.7.6 Appointments

Historic custom and practice had dictated that patients were allocated an appointment without reference as to whether this was convenient or even feasible.

> *".... was the ability to book appointments, because all appointments were online so suddenly the clinician had in their power to say well can you see me next Wednesday and do it in real-time. So that was easy." (P2).*

Examples of double booking in different departments had for some time been prevalent within hospital environments and this was compounded by few mechanisms being in place to communicate other than by post. The onus then remained on the patient to contact the department whereby the whole process was repeated. The appointments schedule experienced gaps due to patients not attending (Did Not Attend – DNA) or gaps occurred where no alternative patients could be added to the outpatient list. This was about to change within audiology. Being able to manage the workload, to look and search for when the next appointment would be available, to be able to book in the patients instantly thereby giving a quicker appointment notification, was the massive benefit (P3, P7) and provided a visibility over what was done, what evidence was there and location of other staff members (P3). This improvement transformed the overall scheduling, capacity management and provided an enhanced service to patients by providing booking choices. Although the underlying process had improved, a note of concern was expressed that although the patients no doubt benefited with access to enhanced technology they probably did not notice that much difference apart from the fact that instead of hand written appointments they got computer generated ones (P4).

5.6.7.7 Clinical Workflow

The flow of work through a department could be characterised by a series of steps which prior to auditbase would involve multiple people and systems in achieving an outcome for a patient.

> *"if I wanted a hearing test done I'd have to send a memo across.... sending a memo across to audiology who would pick it up and they would book somebody in... I wouldn't know the test was done until I got a memo back with the test results on it so for me that was massive difference" (P3).*

Not only were there information islands but a significant number of individuals on hand to assist the clinicians with the data handling with examples given of a full-time person who spent every morning sorting out records and notes (P2) and having to give a full letter to an admin clerk who would have to type out the letter rather than reducing admin time by using a template from the system (P7). One of the ways in which appointments were scheduled in the pre-auditbase days were using a hairdressers style diary system which had the benefit of reducing the masses of individual diaries onto one central manual diary which was completed in pencil to book somebody in and cancelling them by erasing them (P3, P6). The solution, from a clinical workflow point of view, brought everything together as part of their way of working. It was consistent with the way they were actually dealing with the patients as opposed to leaving the patient to sort out the appointment or having to go into other systems. It considerably reduced the manual element of the workflow (P4) and also reduced the pathway through reducing the time to refer for a hearing test and receiving results with status being available on the screen (P3). With the interface to the hearing aid equipment came a more efficient ability to do more technical tasks like programme the hearing aid (P7). The participants described many improvements to the clinical process resulting in a much more

self-contained approach, increase in confidence of the way the service was provided, more control over events and bolstering of beliefs over what was really good for audiology (P4).

5.6.7.8 Standardisation

Within any review of processes the consideration of the operating procedures needs to bring together consistent ways of working.

> *"we realised that it was really beneficial if everybody was on the same system because we could then share information, we'd understand it the same way "(P3).*

At an external level, this was accommodated by the relationships with the hearing aid manufacturers who wanted there to be a single standard so produced the HIMSA standard, which was basically an engine that manufacturers could use to interface between the parameters that are set for the hearing aid and the connection to the hearing aid itself thereby establishing a middle layer system that allowed you to program a hearing aid (P2). This rigour permeated though into the auditbase solution which enabled a more standardised approach to: the data exchange with NOAH platform which enables all these tests still to be saved in the same way (P5); recording by the same process which put the results into the journal entries (P5); and maintaining audiology quality standards by obtaining consent and testing in the same manner (P5). The outcome of a more standardised way of working, not initially identified at the projects inception, came through as a consequence of the introduction of the solution.

5.6.7.9 Identified Beneficiaries

Whilst it was evident that the processes themselves gave rise to improvements it is important to identify who the beneficiaries of this were particularly when considering some of the value added aspects. The participants when invited to comment were only divided as to the priority of who received benefit rather than which stakeholders.

5.6.7.10 Patients

The first area listed in this section centred on the service users and the need to provide something more effective for the patient (P4) which was confirmed by participants (P3, P6).

> *"(main beneficiary) - The patients. Yes without a shadow of a doubt... They had digital hearing aids here before anywhere else in the UK because we were able to do it easily, we have systems to do it, we could do it en masse, yes, without a doubt patients got a better service " (P2).*

Participants went onto describe some of the more specific ways in which the patients had benefited. Booking appointments were done online with the patient being offered an appointment choice at the end of their consultation (P2), there was an ability to manage waiting lists in a systematic and structured way (P2), a tracking ability to inform the clinician that the patient had arrived at the desk, what was happening, and where they were booked in (P3). However an interesting perspective to consider was how visible was this to patients as they still got their hearing aid but may not have noticed that without the system they probably wouldn't have got the appointment as quickly as they were getting it (P7), would have had hand written appointments rather than computer generated ones (P4) and may not have got a digital hearing aid (P7). Perhaps the key consideration is the fact that the staff perceived the service to the patient had improved but evidence from the service users was not backed up by any data presented through a pre-post survey or analysis.

5.6.7.11 Staff

The next area identified was attributable to the benefits observed by the health service staff which is a term which covers a variety of disciplines ranging from clinicians to audiological professionals and administrative support staff.

"I think the staff, I think definitely the staff, in the long-term.... but I think ultimately the patients as well.. "(P5).

A solution ideally will provide support to all staff in their work and has remained a challenge for many suppliers to avoid skewing benefits to one level of the organisation e.g. provision of performance information for managers as opposed to functional credibility in the clinical process. Initially, when asked whether they were the main beneficiaries one participant had responded as being the staff. This developed over the course of the interviews to identify the types of staff who had benefited from the deployment of the solution starting with clinicians and audiologists. Storing things electronically was much more reliable than storing things in the previous manual filing cabinets, allowed the staff to develop and set up clinics at peripheral sites thereby providing more local services yet still link with all the records within audiology (P5). A significant amount of routine clerical duties was removed from clinicians and passed to administrative and clerical (A&C) staff that were no longer having to handwrite things resulting in less mistakes and more efficient use of time (P4). Another staff group identified were those involved with administrative duties particularly around the fact that letters would be printed off automatically with no need for hand written copies (P7). From a managerial perspective, it was possible to use the system to provide information on workload, different hearing losses, throughput of patients by hearing loss type (P7, P4) without having to go through old books, count things manually (P4). This is a powerful weapon when arguing for resources using trends and types of access (P4) and now covers a long period of service change. This replaced lists of things, piles of cards and manual analysis in order to understand capacity and demand (P2). The key observation was that the solution did not solely suit one particular type of staff but covered the whole spectrum of those involved from the clinical process to management information.

5.6.7.12 Indirect Beneficiaries

Almost as unintended consequences the success had wider impacts than just the department and extended to other levels within the hospital, NHS Wales and across into English services. Initially clinicians and IM&T colleagues were persuaded of the benefits (P5) and this began to make an impact by increasing the reputation of the department and the hospital as being innovative (P5). This cascaded into a national presence (P5) and a realisation of what significant work was being done in North Wales (P3) which supported the view that if everybody was on the same system it could then be shared information understood in the same way (P3). This was a good example of the standardisation of audiology services across Wales and an early successful example of an all Wales approach (P5). Over time this led to a co-ordinated approach through user groups with the department very much at the forefront of thinking, improvements and changes. This was achieved through a Welsh auditbase user group which can focus upon all Wales development priority (P5) due to Wales having the same agenda, the same quality standards making it easier to get together and agree requirements for development (P7). The interviews confirmed initial soundings that the development and deployment was a success yet the scale and breadth of this became more apparent as the reflections where captured.

5.6.7.13 Issues within processes

The processes which were revised as part of the solution implementation were refined due to the step change and all participants were unanimous in their evidence of significant improvement to the clinical pathway where the power of the information it brought was 'unbelievable' (P2).

> *".... think everybody found a benefit in some way ..who would be the main one? ..I mean everybody found it .. has had a benefit "(P7).*

The benefits were described as real and tangible (P2), has made a difference to patients (P6) and was a significant sea change at a time where a number of factors coalesced (P6). In addition, they all identified similar or exact references to who benefited, with the only apparent divergence appearing when asked to rank in priority order of benefit.

5.6.8 Organisational Infrastructure and Processes (II) Skills

This section assesses some of the human resource considerations that were present during this design, development and deployment period. It is sometimes not apparent from the initial roles that people are given within projects as to how much of their professional or life skills might play a part in change or transformation. These factors are set out below.

5.6.8.1 Culture, Education and Capabilities

The way things are done can be driven by many factors but the pervading culture was expressed through the CAS and his constant drive to push the boundaries and move the service forward evidenced in the example of use of emerging technology at that time.

> *"a lot of these things were so new people would say we'll get one computer and try it out and we'll roll it out and that.. his view was... we will put a computer on every desk and that was really radical and.. extremely radical... I mean departments only had one computer... it was really radical... I want a computer on every desk and we get rid of all the paperwork"(P3).*

This underlying response to challenges and service provision was underpinned throughout the department. Starting with the CAS he referred to having done a degree in electronics and mainly concentrated on digital systems which linked with a background as a clinical scientist in health which was a legacy that he brought into his work (P2). However he had around him in the department a considerable depth of knowledge and skills covering first degrees in Mechanical Engineering, Science and masters degrees in Biomedical Engineering, Audiology

and some credits towards a Master of Business Administration (MBA) (P3, P6). In addition, several of the team had become audiologists through varying academic or professional examination routes although the base qualification is now a degree (P4). External experiences can be valuable whether they are life skills, professional capabilities and problem solving abilities which in some these stem from just a natural curiosity or specific interest. Some of these were drawn out during the interviews and included a shared scientific base and language (P2), abilities to match new technology and clinical practice (P3), practical enquiring minds over how technology works supplemented by self-learning (P4), and experience from working in different yet related clinical and equipment management environments (P3). In professional role terms they were able to demonstrate and apply their understanding of the detail required to analyse, design and implement the solution from an audiological, clinical and administrative perspective (P2, P5, P7). Outside-in skills, where abilities to undertake an activity and which is transferred to the new environment can greatly assist not only to support but to create innovation in the ideas being considered, there was evidence that such skills had been available and transferred from other areas including ICT (P2, P3, P4).

Reference was made of difficulties at the time where PC's were still in their infancy and competent use was not assured. Such change management issues could have held back the improvements as there were quite a few staff at that time who weren't experienced in use of PCs or had limited IT knowledge (P5). It was noted that in the intervening years this has become a diminishing issue, a generation factor, as more people become confident and competent in the use of technology in their day to day home and office lives and new entrants take it all for granted and can use it immediately (P6). This factor could therefore possibly be discounted in future scenarios.

5.6.8.2 Motivations

Working atmospheres which bring a pride in achievements can also enhance levels of innovation and what is described as intrinsic motivation.

> *"so that's why I got the job really because it interested me and I liked to see how things work whereas some of the other clinicians like to use it and they are not bothered about what happens in the background" (P4).*

Throughout the development and implementation cycle the group demonstrated that they could bring change (P7, P4) and that they were motivated even when it meant working weekends (P3). The motivation was maintained after the deployment and into the continuing support of the solution whether it was finding solutions to issues, upgrade testing (P7) or working with other sites. Those staff involved demonstrated a significant amount of commitment and motivation further driven by a pride of being part of a successful innovative solution at a leading edge of paperless environments.

5.6.8.3 Issues within skills

The teams involved came from a number of backgrounds and provided an effective mix of technical, professional, commercial skills mixed with a range of academically qualified scientists with audiology professionals to collectively bring a significantly wide range of key core skills. Major contributions in terms of leadership, design of workflows and user interface, problem solving, testing, training and general implementation skills linked with a positive attitude (almost pride) being prevalent in the use of new technology, pushing boundaries and a 'can do' attitude.

5.6.9 Summary of Key Findings - Organisation Infrastructure and Processes

A set of geographically dispersed audiology services in North Wales adopted the solution. These factors:

- did not hamper the development of the solution at a hospital department level
- did not constrain the roll out by being too locally specific
- saw significant improvements come from the developments
    - which were quickly replicated elsewhere in North Wales
    - with whole service provision experienced a step change
- benefits from using the system was experienced by many different stakeholders with improvements emerging at many levels in the process and work flow
- improvements were brought about by a mix of professionals who had:
    - experience and skills
    - were motivated to improve the services
    - were led by the CAS who was comfortable with pushing the boundaries of the possible.

5.6.10 IT Strategy (III)

This section considers the impact that: IT strategies may have had upon the solution in terms of what important applications and technologies existed at the time; what competencies and capabilities existed within the IT services; and how resource allocation, prioritisation may have had factor in the solutions lifecycle.

5.6.11 IT Strategy (III) Technology Scope

At the time of its inception of the solution there was minimal impact relative to a national or local IT strategy.

> *"as a service, we were always just looking for the next thing to improve the service and improve what we could deliver .... that's what pushed us to go for a patient management system really that combines everything....it's that constant drive to make*

things better, and we are still trying to do that in other areas... try to make ourselves truly paperless" (P4).

The most widespread application was the Order Communications System (OCS) and PAS solution which provided electronic ordering and viewing of pathology tests, radiology investigations and other therapy based service requests. Such solutions were not departmentally based and did not integrate within the departmental workflow. In addition, the concept of electronic calendars were not widely applied, single departmental databases were not common and desktop software was limited in scope and number i.e. limited PC's were available across the North Wales health service. In the absence of an IT Strategy, it is important to record from where the requirements for important applications and technologies to be developed were derived. i.e. drivers. Some of these emerged during the interviews with a need to combine the clinical workflows with patient data, the development of a paperless environment and a rationalisation of administrative processes. Initially, the instincts of the CAS was to record patient activity, not so much to capture patient data due to the need to capture workload and activity data at a time of budgets being delegated down to departments and having to justify resource use (P2). As highlighted earlier, everything was done by hand with columns to say when items or requests were sent off, when they were back and when the appointment data were sent off (P4) resulting in filing cabinets full of cards (P3). To do this some options were considered, ranging from something home-made, trying to make something else work that was not really designed to or look for an optimum solution (P4). With the changes in the hearing aid environment one of the key requirements (driver for change) was to have a system capable of handling digital hearing aids. This was a truly significant moment in the audiological world and required a significantly different approach to service provision for patients. Something which was being considered was measurements of how a hearing aid is performing in somebody's ear linked to audiogram (P5) and was about

the capturing of the principal dataset around the threshold of hearing which is in a particularly rigid format. It has been described as a graphic equaliser type control that you could put onto a hearing aid giving lots of parameters to play with and the ability to record them in any meaningful way gave rise to the driver to try and record hearing aid settings (P2). All of this would replace the off the shelf NHS provision of hearing aids had been really (developmentally) stagnant for a long time (P4). This challenged the current thinking and provision prevalent at that time with the introduction of client server technologies, relational databases, links between office systems and hearing aid testing equipment and the need for underpinning robust data networks. Any solution would need a robust data structure and a less network intensive architecture capable of interfacing to the HIMSA engine (P2). Disparate working practices were largely hidden and this needed to change and bring about improvements through standardisation and provision of optimum information. In addition, significant factors were driving change at this time which would challenge existing technology infrastructures and approaches. As a technologically driven service the IT was a significant enabler and inhibitor of the success in the solutions ability to be deployed.

5.6.11.1 Findings of technology scope

The solutions required within audiology at that time required a marrying up of new hearing aid equipment, links to manufacturers, recording of digital information and production of information from the clinical workflow. The main application presence at that time was enterprise wide PAS and OCS which did not facilitate an audiology service. The absence of an IT Strategy did not hinder the development of a departmental approach. At that time the implications of this non-integrated approach were not visible.

5.6.12 IT Strategy (III) Systemic Competencies (Distinctive Competencies)

This section addresses what capabilities were evident which distinguished the solution from other applications. It considers the development approach, product stability, information access, and compatibility with the vision of an electronic record.

5.6.12.1 Product Development

The supplier was a small commercial development company who had limited resources and reduced its exposure by linking with a larger commercial hearing aid supplier (P1). It had minimal public exposure and was identified, almost by chance, by the CAS who quickly identified the strengths and the weaknesses of their offerings. Almost immediately after discussions over developing the solution into an integrated approach was muted the larger firm withdrew leaving the small company and audiology department alone to consider future development potential. The competence was derived by bringing the expertise of the software supplier together with a clear visionary understanding of how the audiological business needed to operate in the new environment.

5.6.12.2 Stable Product

The product was not immediately stable but after it had been thoroughly reviewed, assessed and with considerable investment in QA (P1) it became a significant and capable solution.

> *"they were getting bigger as well they had more resource so they spent a lot of time freezing development and actually working on sorting out the architecture and the bugs and after another couple of years it was remarkably bug free and stable and as good as any piece of software that I have used in terms of reliability, probably better actually" (P2).*

5.6.12.3 Information

Arguably outside of underpinning the clinical process the information availability was a distinguishing feature of this solution. It enabled information to be shared, performance

information to be generated, resource use to be identified and forecasted, and increased the reliability. Some of the information issues have been highlighted earlier in the section in regards to cards, paper systems, manual counting but the benefits of storing things electronically (P5) provided an opportunity to have a rapid view, or drill down into more detail (P4). The breadth of the information produced are summarised again as including, staffing, workload, equipment, ordering, stock control, patient lists (inc waiting lists), performance and financial.

5.6.12.4 Achieving the Vision

The long term objectives which were part of the vision articulated by the CAS were delivered through the deployment of the solution.

> *"It helped us really to achieve the sort of targets that audiology's been asked to reach really"(P5).*

Not only was it significant in terms of functional support and information but it also contributed towards quality management and safety (P2), the development of the service outside of the hospital boundaries and to develop and set up clinics at peripheral sites in the community (P4, P5). As a product it was distinctive in that the company has kept auditbase up with requirements including the modernisation and developments within the NHS and has demonstrated its longevity (P5, P6). The product was deployed across Wales and England as part of modernisation initiatives and it became synonymous with audiology departments which is perhaps the pinnacle of distinctiveness. It became almost part of the general infrastructure to any hearing aid provision.

5.6.12.5 Issues within systemic competencies

When considering what distinguished the IT service it was clear that the product was reliable, remarkably bug free and stable and was described as good as any piece of software that the

CAS had used. The move away from paper records brought benefits in day to day operations, appointments, activity measurement and reporting. In addition, it was possible to support and evidence resource bids and demonstrate the enhanced quality service provision. More crucially it was evident that benefits from using the system were experienced by many different stakeholders with improvements emerging at many levels in the process, work flow and information provision. By being an early adopter of technology into the department and being a test site it allowed the ideas to be developed into a reality and to interpret how a public health clinical system would need to work thereby making the vision of local services in the NHS a reality. The solution has passed the test of longevity by demonstrating consistently its ability to keep up with changing service requirements including a more dispersed service provision.

5.6.13 IT Strategy (III) IT Governance

This section considers the impact of the limited maturity of the IT departments at that time and how the governance impacted upon any decision making around the solution. The initial observation was that limited control over decisions were not handed to any project governance structure e.g. Project Board.

5.6.13.1 Authority for development

There was no detailed high level strategy at a hospital level and in this case the department had a track record of innovation and just proceeded to move forward after limited consultation.

> *"this is where the interesting governance is..... well this sounds like a really good idea and I spoke to the Director of Finance and the Chief Exec and said look I think there's something in this for us under the banner income generation... it was in the days when you could get access to people like that quite easily and there wasn't a lot of business case type activity that had to go on and by my track record about what I was*

delivering in the service they sort of backed in their view a winner and thought we'll give it a go"(P2)

It was therefore not within a list of competing priorities considered by an independent committee and was freed of some of the project limitations around documentation and justification. However, it transpired that other departments had bought it on a business case with an investment and return particularly in the English system and that people were able to demonstrate the benefits (P2). Later still NHS Wales went out to tender although the governance was more at a national level rather than local approval as the funding was provided at an all Wales level through its modernisation programme.

5.6.13.2 Risk

There was also limited consideration of risk factors whether with the current service state or the future service state. Although issues did start to arise when the product failed to sell more widely these were only around the prospect of having a product with no potential supplier in existence. Any 'loss' would have been around the development of the product and the time invested. This might have led to a debate over the intellectual property which was far from clear in that the value owed to the hospital was the ability to interpret how a public health clinical system would need to work (P2) rather than how the technical infrastructure and interfaces of the IS worked. The risk was limited to the time spent by the department in assisting with the redesign of the solution to fit clinical audiological practice and was before any practice of charging time out to non-core clinical activities.

5.6.13.3 Resource Provision

In the absence of any other structure the resources were largely committed from within the department. As stated earlier, the CAS with agreement of the then DOF wrote an agreement with the company for a profit share on sales in the first two years. Eventually they received a

benefit, a cash benefit, and were in the fortunate position that the trust, as it was then, allowed them to reuse that money back into the service provision (P2).

5.6.13.4 Supplier Risks

The development risk started with the supplier as it worked with the initial department to design and put together a coherent response to the requirements. As they were attaining more sales and larger organisationally they had more resource and they spent a lot of time freezing development and actually working on sorting out the architecture and system bugs (P2). This reduced their support issues. The financial stability risk was further reduced when the Welsh procurement took place and very soon afterwards England put the supplier, with a rival, on its framework contract and gave options to buy either (P2). By this time the supplier was heading towards a monopoly which could potentially, over time, increase the risk of stagnation into future development of the product. This risk is fairly mitigated as the supplier receives a heads up from the auditbase user group and they remain current in their knowledge on what's going on within the NHS and the trends (P5).

5.6.13.5 Confidence building

Initially the users were aware of shortcomings in the product and the development of user groups addressed this in closed sessions at the beginning of the day where all the people there would discuss what sort of problems they had individually been having at the time (P7). However, this has now ended because the same sort of issues that people perhaps were having a number of years back are not now occurring (P7) and the relationship has matured to one where there are no closed sessions and communications exist so that they can develop the system together (P7).

5.6.13.6 Issues within IT governance

The IT departments influence and wider organisational governance of that period identified that this had limited impact upon any decision making over this solution with no detailed

high level strategy at a hospital level. As a result, the investment was not within a list of competing priorities or run as a corporate project. The trust allowed reuse of money received back to be used in support to the service. Funding was provided eventually at a national level as part of the modernisation programme. Limited consideration was undertaken of risk factors or the potential intellectual property benefits whilst the development risk remained mainly with the supplier. Financial stability risk of the supplier was further reduced when the Welsh procurement occurred and this was aggravated as NHS England also commenced a similar approach. The relationship has matured and the supplier receives the heads up from the now established user groups which have an influence of developments rather than through outright governance responsibilities. The supplier remains current in their knowledge and communications exist with sites and user groups so that they can continue to develop the system together rather than at the behest of an overarching HB governance committee.

5.6.14 Summary of Key Findings – IT Strategy

The absence of an IT Strategy did not hinder the development of a departmental approach. However other factors emerged:

- at that time the implications of this non-integrated approach were not visible
- being an early adopter of technology particularly in a design and subsequently in a test environment brought about a competence which turned visions into reality
- it was designed without onerous governance and was not stifled as a result of local competition for resources
- suggests that each department is more effective considering its own investment criteria and resources rather than bid against other disparate clinical services e.g. similar outcomes in the development of cancer IS are in existence

- a robust and stable solution was a significant competence which underpinned the service and delivered operational, planning and performance information over a long period of time which saw many changes in requirements
- this suggests that alignment of informatics solutions are optimally designed, delivered and deployed under the governance in close proximity to the service requiring support rather than remote governance committees who have to rely on reports and prioritisation criteria.

5.6.15 IT Infrastructure and Processes (IV)

The audiology service in its early days ran, to a large extent, independent from the wider IT infrastructure utilising networks which were installed by the department and a server built by the CAS (P2). Minimal influence came from the local organisation or even national perspective leaving the way clear to develop their ideas without any overarching influences. Later as the solution became established, the structured cabling initiative across all hospitals in Wales provided a firm backbone for the systems to run as part of a wider infrastructure.

5.6.16 IT Infrastructure and Processes (IV) Architecture (IS Infrastructure)

As indicated above the solution was largely self-contained within the department. This was an era where technology was in its infancy at a departmental level and the rise of an IT professional had yet to take place. The product was unattractive yet functional because it resembled a DOS-based as opposed to Windows-based environment. However, the underlying back end was robust. The front end looked old fashioned in its design but overall users identified that it supported the way they thought, and the way they worked (P3). In the wider environment, minimal planning took place and prioritisation was unnecessary as the requirements, demands and funding were simple unconnected desktop machines. Later came the impact of integration requirements and the development of standards. This may have had

some bearing on the reason why interfaces to Patient Administration Systems were not developed (P4) until later in the product cycle.

5.6.16.1 Issues within architecture

The solution developed without being overseen by organisational IT. Standards were yet to be developed and enforced and departments were relatively given a free hand where they had the appropriate knowledge and skills. Integration was more difficult at that time but was resolved later in some installations across North Wales.

5.6.17 IT Infrastructure and Processes (IV) Processes

With no professional discipline existing in enough numbers to create a critical mass the formal procedures now much prevalent under Health Care Standards (HCS) or international standards were limited. In the early days some of the configurability wasn't hidden, anyone could access it, but as the product developed more and more was accessed by the system administration side where only certain people had the right to make the changes to avoid any catastrophic events. These were rapidly tied down. Most of the support was initially handled within the department by the CAS with the supplier willing and able to assist as necessary.

5.6.17.1 Issues within processes

Limited formal methodologies to support practices and application management existed within the department or the wider local organisation. This potentially opened the solutions up to operational risk, which in terms of custom and practice was acceptable in the wider scale of things.

5.6.18 IT Infrastructure and Processes (IV) ICT Skills

The wider IT department was limited in numbers and influence. At that time it was not uncommon to have moved into IT by accident or through showing interest (P4). Skills were largely brought to the environment by the individuals circumstances or training (P2, P3) and this is highlighted elsewhere (culture, education and capabilities) in this research.

5.6.18.1 Issues within ICT skills

The solution was developed and supported in the absence of formal training and education. Experience and personal knowledge counted for more than formal training which at that time was not as structured and available as it became later.

5.6.19 Summary of Key Findings – IT Infrastructure and Processes

At the time of the development:

- it was still possible to bring personal interests and experience into the working environment
- risks were introduced as software was more open to manipulation rather through accident than by malevolence
- minimal training was available
- their ability to resolve day-to-day operational problems were restricted when departmental solutions joined the local infrastructure and came into the domain of the IT professional.

5.6.20 Importance of Findings to Research Questions – RO2

This objective has identified the key findings and presented them in a manner consistent with Lutman's - The Twelve Components of Alignment (1996). It demonstrates some consistencies but also differences and these will be explored in Chapter Six.

5.7 To explore the use of alignment models, frameworks, methodologies and best practice guidance – RO3

This objective considered the use of alignment models, frameworks, methodologies and best practice guidance within the case study context. The main themes are presented in Figure 5.3.

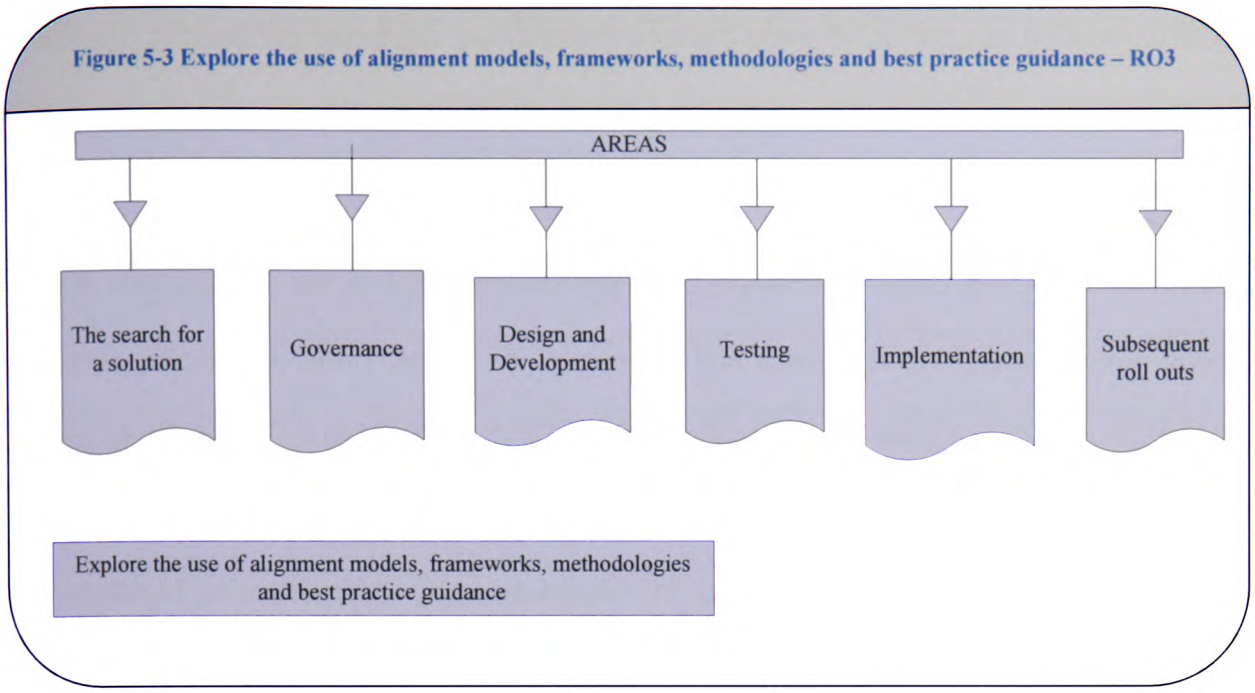


Figure 5-3 Explore the use of alignment models, frameworks, methodologies and best practice guidance – RO3

5.7.1 The Search for a Solution

The background to this section has been set out in RO1 (5.5.1). The initial interaction with suppliers was not based on any formal strategy at a local or national level. It was largely driven by opportunistic enquiries and networking within the profession seeking out innovation at the beginning of a period of change in the audiology environment. The way forward was mainly based around a professional view of what was required without any documented consideration of any methodology or framework. It was largely taken as read that the approach would have to be technology based and would underpin the clinical processes whilst improving the capability of the administrative overheads. Any strategy which may have been considered emanated from the department rather than an Organisational or National level. Technology was considered upon an individual and local knowledge and the project was built around the available capacity and capability. Although informal the professional view did consider a number of aspects which are contained within some methodologies: technology (P2), processes (P2), information (P5), stakeholders (P3),

HR (P2) were all aspects which were contained within the alignment perspective (Avison et al., 2004), Balanced Scorecard and Managing Successful Programmes.

5.7.2 Governance

The previous section (important factors to alignment) referred to the less onerous regime around governance of developments and investment decisions. Little opportunity therefore existed for outside agencies or parties external to the department to consider the impact or interactions. Diagrammatic or written change proposals such as IT Roadmaps or blueprints were not created or in fact requested by the organisation. It is important to highlight that although these requirements were not written down in a formal sense they did still exist and were a common understanding within the team and for the future (P3). This was based around the vision jointly constructed between the CAS (P2) and the supplier (P2). This visionary approach has commonality in areas such as stakeholder perspectives found within the BSC and the future state as part of a MSP Blueprint. The next stage was to consider any influences to the design and development stages.

5.7.3 Design and Development

Right from the beginning, the department had a picture of what was required not just locally but for the UK (P3). This vision was about a paperless office and certainly audit base linked in with that ideal (P5). The CAS wanted it to link in with the hospital system, to obtain information, to initiate an open architecture between the hospital system admin and audiology (P5). This was based around intuition rather than any alignment model. Yet these considerations linked back to a vision (P2) which when compared is contained within a number of the methodologies. This is highlighted above by consideration of technology, information and a new way of working without paper (processes). The programmer came over and sat with the department and looked at how the clinic worked (P2). It was identified that the user was important and how the system looked to them (P3) but the product written

by the software engineers had no relevance between the functions and how it operated clinically (P2, P5). Having installed the product (that they had installed in Denmark) there was an iterative cycle as the team went back and walked through the process before looking again at the IT which made a significant difference (P3). Some documentation was drawn from this work which made it easier to talk to the programmers (P2) but a lot of the software programming happened on the bench in the department and an awful lot of modifications and wish list issues came about because the software programmers were local to the team (P2). This also resulted in a lot of on-the-fly development in the first year (P2). This principal of getting programmers to programme next to clinicians and prototyping things was recorded as a success and would be planned in any other future development (P2). The key aspect here was the iterative approach of what was a key process to deliver success of the solution. Although the approach was more of an agile methodology at that time it was not recognised as such, nevertheless, it does concur with the IAF approach where the design phases are linked through the visions, business and IT systems to ensure an integrated solution. The early iterative development approach described as similar to what is now described as Agile has subsequently been adopted formally by the supplier (P1). Again when asked participants could not recall any particular approaches or methodologies used although felt that more sign up from corporate IM&T services should have been sought (P2). The technology was also considered in detail by the CAS (P1) who identified the appropriate 'engine' that a solution should be based upon with a structured query language (SQL) database to ensure a robust infrastructure for the application. This is the nearest indication that a more formal design and consultation process might have helped align the solution (P2). This was another aspect where a more structured approach as typified by BSC and MSP would have identified important aspects of integration with wider architecture and corporate systems however it is recognised in hindsight that such tools and technologies were not well defined or available at

that period in the solutions life cycle. The information requirements were less well defined at the start of the design as, in true information principles, the outputs would be a by-product of the operational processes which was the case. This was perhaps one area where some divergence from accepted principles occurred in that the deeper consideration of information requirements was subservient initially to the process workflow. Comparing the way of working there are similarities with some approaches drawn from other domains of knowledge like Lean and ST.

5.7.4 Testing

Best practice currently would implore the reader to set out detailed scenarios and test strategies and plans, not something which the participants described:

> *"..when we had the new, any new version of the software it would be a case of just doing the basic testing so we would make sure for example you can do the basic functions, run through, we would have the test patient, make sure we can bring up that test patient, we find that test patient, we can add a new patient, we can put the patient into the diary, we can print from that function, we can make a new ear mould, we can do an audiogram, it saves that audiogram "(P7).*

> *"...wasn't like a test sheet or anything but going through the basic processes making sure it did all of those first before going on to the clinical processes and then after that, sort of, if there were any, sort of, changes with the software" (P7).*

There was no evidence that any particular perspective was considered. The transitions and transformations under structured methodologies would have identified further key processes which were required as part of project cycles and would have identified testing and implementation aspects for consideration. Projects and programmes identify states of readiness within their structure and have become key transitional activities in more current

environments. The case study was moving from predominantly paper based approaches to enabled electronic pathways and such comparison to current methods may be limited but the aspects of readiness are now key activities. These are best highlighted in the balanced scorecard which considers the wider aspects within its learning and growth quadrant by identifying states of organisational, human and information capital.

5.7.5 Implementation

The detailed responses around the implementation are set out in other parts of this chapter but one of the key differences with a more modern best practice approach was the absence of a formal project team and manager. Later some project management was put in place to comply with national government funding but in a loose arrangement:

> *"we did do Prince project management and I seem to remember from Prince you have end project reports but from what's in my memory now I think it was very much... yes we've achieved this objective we achieved that objective and we've achieved that objective... rather than saying 'oh next time it's done we should do it this way or for the benefit of people in, you know, New Zealand, when they go this you should do it this way...we didn't think about it in its wider context "(P6).*

In addition, formal checklists around readiness (now considered best practice) were not formally used and issues were dealt with as they arose. In fact the feeling given by participants was that after the desktop technology was put in place the department went live very quickly afterwards.

5.7.6 Subsequent Roll outs

Following the MASW initiative the wider roll out was subject to best practice procurement which took place under competitive tendering.

"it was agreed at the outset that we'd have one supplier and that went to competitive tendering and all that... with help and input from Welsh health supplies" (P6)

However, implementing best practice does require some knowledge on how best to use such guidance:

"we designed the specifications.. we knew ... or we thought we knew what we wanted" (P4).

"I guess there's a bit of a trade-off..but I'd have thought.. in terms of procurement and defining what you need then... then ...that should be done collectively as well so you actually agree about how the system is going to be used rather than just about what you want off the shelf"(P6).

Embracing the solution along the modernisation agenda by the WG of the time did demonstrate the importance of convergence of activities around the appliance, suppliers, solution, environment, training and knowledge which again suggests that a more structured approach was successful on a wider platform to bring the benefits into the service for patients. Subsequent roll outs across North Wales and beyond did employ an element for project methodology as part of the structured approach. The impact of national audiology strategy began to leverage the patient benefits brought about by the issue and support of digital hearing aids. In other strategies this may have caused difficulties with the appliance technology outpacing any development of IS but in Wales this was not the case. The adoption of a more standardised approach was as a direct impact of the strategic initiative although the underlying computer IS was almost not available due to the lag between the development of product and the delay before the initiative. There was also a clear link between the service change and the underlying benefits of the IS within the initiative.

5.7.7 Importance of Findings to Research Questions – RO3

This section has identified that minimal consideration was made of alignment methodologies or more formal best practice available through today's standards. When considered against perspectives identified within chapter three there was a consistency and commonality of areas albeit in a more informal environment.

The findings:

- did not invalidate the absence of models but suggests the lighter touch and informality was based on experience and knowledge
- identified alignments with business requirements were not structured into a formal strategy at a local or national level with the main driver being a professional view of what was required
- drew the reflection that over time strategies from other domains are having an increasing effect upon continuation of effective alignment
- publication of other national strategies has challenged the existing premise which has been successful to date at a patient flow level raising the questions as to:
    - whether the absence of other strategies at that time were an enabler
    - strategies have now become too prescriptive by focussing on the initiative rather than the continuing alignment objectives e.g. ICT strategy.
- that strategies had minimal influence upon original innovation and development of IS products but:
    - when included as part of a wider announcement can almost derailed the innovation by cutting the demand stream for suppliers
    - almost overwhelm them as the artificially created dam of demand was released. This was explored in RO1.

- to build an implementation around the available capacity and capability the technology was considered solely by an individual who used:
    - local knowledge
    - his professional expertise
    - technical electronics training
- gaps appeared around integration with other systems and flows of information e.g. demographic sharing, RTT.
- differences existed with more modern best practice approaches with the absence of:
    - a formal project team and manager
    - formal checklists around readiness
    - recording and treatment of issues as they were highlighted
    - limited preparation was mounted before implementation, issues being resolved as they occurred… a flexible response to deployment
- downside risks to potential customers were small and lack of best practice examples or models had minimal adverse effect to moving forward and success.
- use of best practice extended only into procurement but without the experience in the use of such guidance actual use was somewhat diluted
- this could suggest that due to its size and scope of the solution any methodologies available to the department were somewhat superfluous in that the interactions to achieve alignment were self-evident and known prompting the suggestion that methodologies are more useful when the number of unknowns or interdependencies are significant in number, size and complexity.

5.8 To explore the incidence of new approaches emanating from other domains of knowledge including System of Profound Knowledge, System Thinking , Lean, and Theory of Constraints – RO4

This objective considered the use of approaches and process improvement techniques from other domains of knowledge within the case study context. The main themes are presented in Figure 5.4.

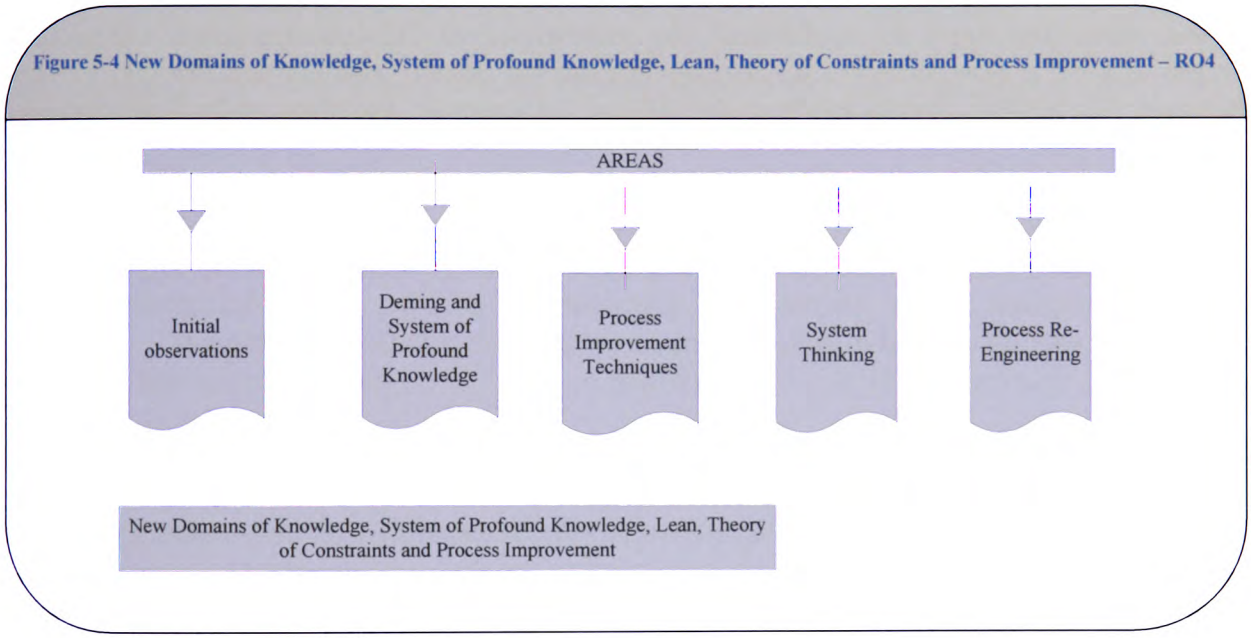


Figure 5-4 New Domains of Knowledge, System of Profound Knowledge, Lean, Theory of Constraints and Process Improvement – RO4

5.8.1 Initial Observations

The initial observation recorded is the absence of any participant recounting the use of what can be described as new approaches. Whilst they were all familiar with the more commonly used phrases and techniques such as process improvement or process mapping they did not identify the work they had undertaken as being part of a lean, theory of constraints or systems thinking philosophy (P3, P4, P6). This was an interesting response and only when the underlying concepts were introduced into the interview did some participants start to identify potential links with Agile development techniques (P1). The interviews did elicit some

characteristics and this section discusses these findings and where appropriate highlights the elements that can be construed as related to aspects found within the new domains of knowledge. Using the framework created within earlier literature review work the first domain of knowledge considered related to Deming and his SPK.

5.8.2 Deming and his System of Profound Knowledge

This section structures the case study findings in Deming's four SPK segments which were outlined in more detail in chapter three.

5.8.2.1 Appreciation for (knowledge of) a system

It was clear that the CAS understood the importance of the interdependent connections between the patient, digital hearing aid, digital information, interface with manufacturers, staff use and workflow, underlying infrastructure and environment. This was reinforced by appointing a key member of staff to deconstruct the existing offering from the supplier and to rebuild in a way that would match the clinical workflows across the department.

> *" actually knowing what you want or what's best is quite difficult because you end up trying to replicate your paper systems and they're not always the best ways to do things... "(P4).*

The intentions over the future were clearly identified at the outset and had been apparent as an objective whilst scanning the horizon for solutions. In this case a fundamental element was to have a paperless approach (P1). It was clear to the CAS of what would be needed to make it work in the current and future state and he was able to articulate this to his colleagues. There were examples of management understanding all the barriers and interdependencies with interventions in: the development of an understanding of what was required; support to staff in making the transition; and liaison with senior executives to gain approval to undertake the developments in cooperation with a partner. The relationship

extended with the supplier over a long period with the CAS continuing in the role of articulating the direction of travel for the audiology profession and its service developments (P1). Deming refers to the responsibility to define the organization's purpose and to communicate that purpose to all employees and in this development the management leadership was well demonstrated at all levels of intervention, in fact, was a key feature of its success. Whilst Deming believed that organizations should be concerned about the long term its interpretation within a public sector has partial resonance. Both the supplier and the CAS had long term visions of the future which were mutually inclusive (q.v. paperless, digital hearing aids better for patients) yet little reference was identified about the focus being on the wider group of stakeholders. Being an income generation initiative was a feature which contributed towards the wider organisations financial stability but the specific links to anything outside of the department are difficult to trace. There was evidence from the suppliers perspective that perhaps unknowingly the Deming chain reaction had been followed. The improvements in the product stability following the investment in specialist testing resulted in a reduction of support costs and an ability to further invest in the quality assurance process (P1, P2). The success of the proven product did in fact capture the market to the point of a monopoly which to both supplier and customer remains an area of concern (P1, P2). Deming (1986) summarised his belief that the customer was the most important part of the production line being necessary to understand their needs and wishes. From a customer of audiology services perspective although they may have received an improved service the choice was restricted to the service offered to the public with the only other main option being to avail themselves of the private sector. This in the early years also prevailed in England but with the Payment by Results initiative the competition aspect may have become more significant to customers as centres vie for the business. Looking at the supplier of the auditbase product this belief has more resonance in that a mantra expressed by the owner was

" listen to your customers ... Always listen to your customers.. Its old school but it works" (P1).

Successful attempts were made to align all the components within the system and also within the wider organisation which formed the boundary within which services were delivered. Described by Deming as 'optimization' this worked for many years but was slightly destabilised with the advent of organisational change, a change of wider organisational boundary, which required re adjustments to be considered. Deming went onto explain that not all of the components would maximise their contribution with some having to operate sub optimally. This may go some way as to explain the issues described around the integration problems with the wider IT and data processes where the solutions were less elegant. From a supplier perspective in the early days, in line with many start-ups, losses were incurred as the product was tailored to the individual client creating a support issue before the variation was reduced, quality was improved and a enhanced product deployed. Another portion of the Deming view was around the willingness of people to work together for a common goal and there was plenty of evidence that the department were totally behind the aims and goals set out by the CAS. They demonstrated their commitment and motivation and where reticent were open to assistance to complete the journey of transformation. Failure to do this would no doubt have led to suboptimal results as described at other centres where implementations were 'done to them' or their process was split between scheduling via enterprise wide PAS and the clinical elements of audiology recording (P4). Deming (1993) referred to the link between greater interdependences and greater needs for communication and cooperation between them and this would have been much easier in such a small department. As the product developed and was deployed across Wales the communication was largely confined to a site by site basis but the instigation of user groups became the surrogate to continue this dialogue across organisational (system) boundaries (an all Wales boundary). As described

this becomes harder as the numbers involved rises with more compromise being required. This therefore confirms that the system, now with a wider boundary, whilst being supported ends up with some areas being disappointed (developments not supported) and no doubt, in their terms, being asked to work sub optimally. This concurs with Deming as the boundary of the system being drawn around a single company, or around an industry becoming more difficult to manage.

5.8.2.2 Knowledge of variation

Deming summarized the importance of understanding variation and described two types: common and special causes.

5.8.2.2.1 Common Cause Variation

In the context of the interviews two main groups were identified the first being the supplier. As described earlier in an attempt to please customers the solution was developed and somewhat tailored to the local requirements. A situation therefore emerged where not only were there significant differences between the geographic products in Denmark, Scandinavia and the UK but also existed between the different sites in Wales resulting from solutions being highly configurable and, not unsurprisingly, diverse. This was the second group where the advantage of flexibility had resulted in different code sets, user screens and interface differences, database and field variations which resulted in difficulties of extracting data in a consistent way and made comparative work challenging. Although this at first did not hamper the success of the solution subsequent changes in the system boundaries highlighted this variation. Thus the products ability to cope with variation led to complications later in the life cycle. However the underlying processes were to a large extent similar due the requirements to link with suppliers through one consistent interface to calibrate digital hearing aids. A weakness was the connections or access to a consistent source of demographics which inevitably leads to issues of data quality when compared to other organisation sources.

5.8.2.2.2 Special Cause Variation

Minimal evidence emerged in the interviews of special causes and where initially it seemed to require special intervention they ultimately were swiftly dealt with by management and through leadership.

5.8.2.3 Theory of Knowledge

This first emerged in the discussions over aspects of training which in some participants eyes was limited due to the lack of 'knowledge' about audiology by the supplier. Leadership in this area was key and the CAS, previously described, was able to make up the initial gaps for the supplier. It was the local department which provided the detailed understanding of the clinical processes which enabled the supplier to respond (P3). This was an iterative process similar to that advocated by Deming based on Shewhart's (1939) PDCA cycle. This was supported by allowing the staff to be fully involved in the design and creation of the solution by giving time, authority and recognition to their achievements. However over time, with the initial focus diminished by the day-to-day activities, another issue has emerged where users now have differing knowledge about what the system can do, how they optimise its use or bring out additional benefits. This was highlighted where the local specialist admitted that they were unable to identify all the functionality benefits which would suggest that the initial PDCA cycle no longer functions on a systematic basis. This may be compromised by statements made about the consensus approach required for improvements in functionality through the user groups or the unwillingness to share experience because of competition between sites (P7). Leadership however remained omnipresent within the solution development and implementation identifying knowledge gaps in not only the obvious areas but also the individual's softer, hidden ones which were immediately addressed. This would suggest that as functionality develops or people move onto other roles that the knowledge transfer also weakens.

5.8.2.4 Knowledge of Psychology

One of the most important roles of management is to create a work atmosphere that nurtures intrinsic motivation. This is fundamental to establishing innovation and the level of motivation, pride in achievements were widely apparent with participants able to highlight their part in the success of the solution. It would suggest that the tone within the department had been appropriate with just the right level of leadership rather than 'command and control" usually experienced within project environments. The interviews produced minimal evidence of extrinsic forces at work during the products life cycle and participants were genuinely pleased to be part of its success and the learning that had originated from this source. Although some felt that they were from an older professional generation they retained their motivation and readily acknowledged their part in the success. Support to progression and seniority over the years was drawn out from those interviewed. The next section considers concepts, described in chapter three and which provide a focus upon Process Improvement.

5.8.3 Process Improvement Techniques

In the first instance there were no factors which would suggest that at any time were system constraints (TOC) considered in the design and development process or statistical techniques used to measure fluctuations in the process with the understanding limited to paper based walk through of patient pathways (Six Sigma). Lean appeared to have more resonance with the activities described by participants but on closer examination questions around 'value added' steps in the process suggested that it was subjugated into more normal process mapping considerations and the customer aspect was not a factor in the design. This came from discussions where participants described the initial product suggesting: it was difficult to navigate (P3); required a rearrangement of the screen orders in line with patient flows through the clinic (P2); needed support to the analysis through an early use of process mapping (P5); was all about understanding how the process worked in practice and the

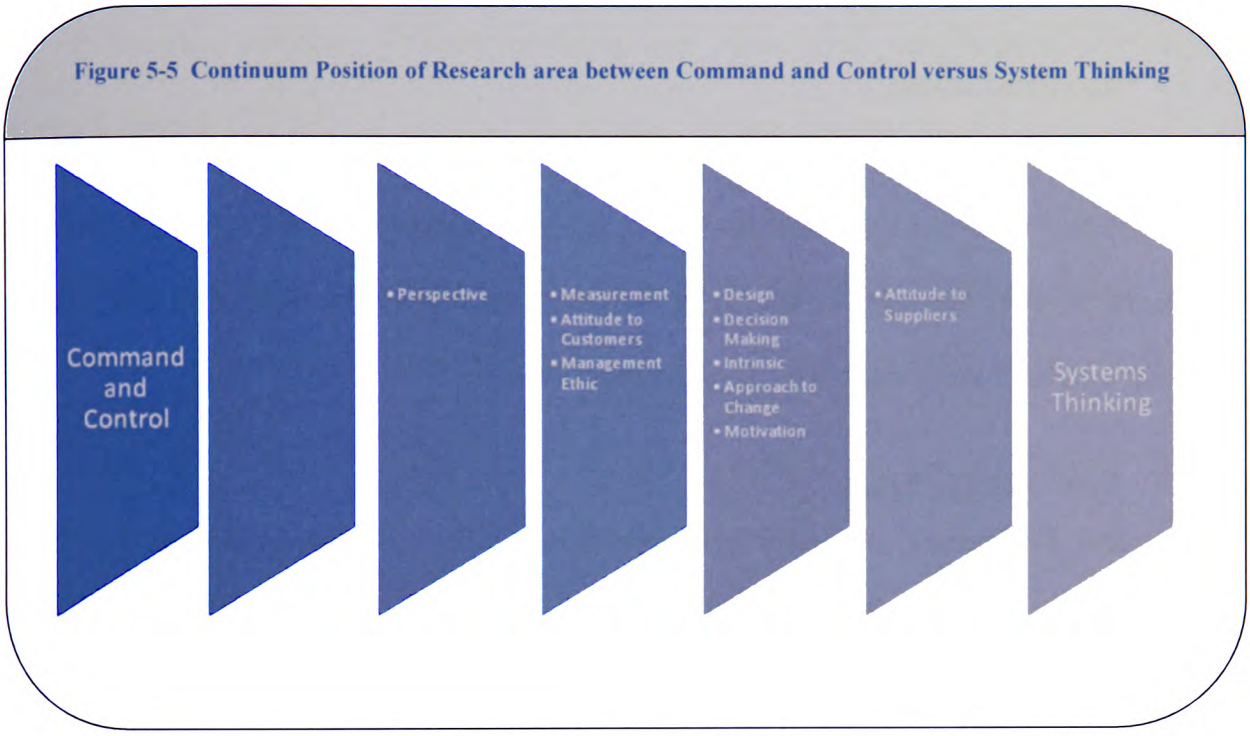
interaction with patients (P3); and deconstructing the process and reconstructing to support the flow (P3). It did, by future proof designing, simplify the process from a paper based one, reduce variation by providing one way to work through the system (P3), and has improved services over time for patients (P3) in small iterations rather than deep analytical studies. Another aspect of lean described by Zokaei et al. (2010) who suggest that Jidoka in a service environment could be translated as intelligent systemization, i.e. introducing systems and standards of work without turning off employees ability to think and actively take decisions. To this extent elements of systemization, not acknowledged by participants, were present in the standard way of working embedded within the technology. However autonomation which focuses on effectiveness, on quality improvement, and the independence of the worker from the system are not as prominent. This references the use of such words as making it intuitive and how they wished to work (P2) as well as acknowledging that the link between the process and the IT made a big difference (P3). Early gains in productivity since the time of moving to a paper-less pathway have not continued with additional performance improvements usually associated with lean and there has been little organisational appetite to provide sustainable change through a Lean initiative.

5.8.4 System Thinking

No references were directly drawn out from the participants over system thinking but deeper analysis and comparison to work, undertaken in the literature review, suggested that underlying the interviews were aspects which closely resembled some of the fundamentals outlined in chapter three and described the background to the application of ST in the public sector. Seddon (2005) introduced the different approaches to management and design of work and contrasts ST with conventional approaches (termed command and control) where fragments of an organization are optimized with little reference to the wider organization; and a systems approach which focuses on the interrelationship between the various parts of the

organization. By turning Seddon's comparison table (Chapter three - Table 3.3) into a continuum with the two management approaches at extreme opposite end it is possible to identify where, if at all, the auditbase solution was influenced. Figure 5.5 follows with exploratory text on the reasoning.

Figure 5-5 Continuum Position of Research area between Command and Control versus System Thinking



The overall picture emerging is that the approach has been more aligned to components associated with ST.

5.8.4.1 Attitude to suppliers

Starting with the strongest component, Attitude to Supplier, evidence suggests that both the department and the supplier have derived significant benefit from a spirit of cooperation rather than contractual relationships. The department initially were able to get things their own way (P3), have had economic benefits of licence arrangements and early sight of new functionality to review (P7). This expertise in the department has benefited the supplier when testing new elements as well as strategic insight (P1) into the likely changes within the world of Audiology.

5.8.4.2 Design

To an extent this approach started early in the life cycle at the design stage where the flow of processes were identified by the departments architect based around future ways of working. Supported by an iterative approach to development, alongside the prospective users, helped to create a cohesive response to ensure benefits from a paperless approach were realised (P5).

5.8.4.3 Decision-making

Along with the pathways the software was designed to allow the decision making to be made by the clinician at the most appropriate time in the process and reduced the need to introduce delays whilst approvals were sought. In some cases this was a simple as being able to refer and book a patient with a colleague from the desktop.

5.8.4.4 Approach to change

The process did change over time but more tweaks (P6) than major changes and in its inception minimal formal project methodology was employed.

5.8.4.5 Motivation

The design, development and deployment built and was successful upon a motivated staff complement who were encouraged to participate and embed the change into their way of working early in its transition i.e. was a process of change not an event.

5.8.4.6 Measurement

Moving towards a more balanced position in the continuum was the measurement activities. It was certainly designed against the purpose, as it had to be, in order to achieve compliance with hearing aid supply and calibration. However almost inevitably the information which such detailed data could provide was used to manage activity forecasts, assess productivity and compete within the wider organisation for restricted resources.

5.8.4.7 Attitude to customers

Patient centred services are by their nature focussed on providing a good outcome to the service user. The solution started at a time when no contractual relationship existed with patients but was superseded with a guarantee by governments to maximum waiting times which became increasingly more onerous. Therefore its design and improvements became less about what customer thought mattered and more what was targeted by national government (e.g. RTT).

5.8.4.8 Management ethic

The outcome was largely the same for the management ethic in that implementing a system to improve the outcomes was gradually overcome by the need to manage budgets and obtain value for money from employed staff.

5.8.4.9 Perspective

Finally there is no doubt that the CAS took his vision and ensured a solution was discovered, designed and deployed. From one perspective this could be viewed as top down but from a national perspective this was more a bottom up approach. So what emerges is that there was a bias towards a system thinking approach in the early periods of development but over time the elements move more to the centre of the continuum and further research will be required in the future to see if this transition finally ends in a command and control approach perhaps as part of a national integrated strategy. Such bespoke software is likely to be a low priority in this environment.

5.8.5 Process Re-Engineering

'Process re-engineering' describes a focus on process improvement in order to increase operational efficiency (Davenport, 1993, Hammer and Champy, 1993). To obtain improvements the processes need to change innovatively resulting in enhanced lead time, quality and cost reduction. There were strong elements described by participants that there

was a drive to improve and support the processes (P3) with this aim. Other responses drew attention to the fact that no processes were identified as part of later procurement requirements and although feeling that this might be risky rationalised the statement by suggesting that sometimes you can over complicate (P6).

5.8.6 Importance of Findings to Research Questions – RO4

The headline observation to be recorded is the absence of any participant recounting the use of what can be described as a new approach or philosophy such as lean, theory of constraints or systems thinking. The interviews did elicit some characteristics that can be construed as related to aspects found within the new domains of knowledge with the first area being Deming and his System of Profound Knowledge which is summarised in its four components.

5.8.6.1 Appreciation for (knowledge of) a system

Although not referring to the different Deming aspects by name the CAS demonstrated characteristics which were consistent with knowledge of a system as he:

- identified the components of a system being the patient, digital hearing aids, digital information, interface with manufacturers, staff use and workflow, underlying infrastructure and environment
- appointed a key member of staff to deconstruct the existing offering from the supplier and to rebuild in a way that would match the envisaged workflow from manufacturer to patient
- clearly identified the intentions (of the system) and there were examples of management interventions to ensure the interdependencies worked and barriers were removed
- made sure his intentions were communicated to all involved, who were totally behind the aims and goals.

Furthermore he provided:

- further evidence of the importance that leadership had made to the success and this was shared also with the supplier who shared the CAS's long term visions of the future with the supplier perhaps unknowingly achieving this long term vision correlating with many of the steps identified within the Deming chain reaction.
- assurance that the supplier understood their (customer) needs and wishes and responded accordingly.

In addition:

- successful attempts were made to align all the components within the service provision (system) and also within the wider organisation which formed the boundary within which services were delivered
- this was slightly destabilised with the advent of organisational change, which produced a change of the wider organisational boundary, and required re adjustments to be considered
- some evidence existed that some elements had to operate sub-optimally and this is perhaps best exemplified around the integration problems with the wider IT and data processes
- some of the interdependence challenges between components can be mitigated by enhanced communication and cooperation between them and it appeared to be easier in small departments
- as the product solution became more widespread the instigation of user groups became the surrogate to continue this dialogue across organisational (system) boundaries (an All Wales boundary)

- the system, now with a wider boundary, whilst being supported ends up with some areas being disappointed (developments not supported) and no doubt, in their terms, being asked to work sub optimally.

5.8.6.2 Knowledge of variation

In the context of the interviews two main groups of variation were identified:

- the first being the supplier who to please customers developed the solution tailored to the local requirements. This led to:
    - significant differences between the geographic products in Denmark, Scandinavia and the UK
    - but also existed between the different sites in Wales resulting from solutions being highly configurable and not surprisingly diverse resulting in different code sets, user screens, interfaces, database and field variations
    - difficulties of extracting data in a consistent way and made comparative work challenging
    - only came to light when subsequent changes in the system boundaries highlighted this variation
- the second centred around underlying processes which were to a large extent similar due the requirements to link with suppliers through one consistent interface to calibrate digital hearing aids but suffered weakness in connections or access to a consistent source of demographics which inevitably led to issues of data quality
- the products ability to support the processes (system) yet cope with variation therefore led to complications later in the life cycle.

5.8.6.3 Theory of Knowledge

This first emerged in discussions over aspects of training which in some participants eyes was limited due to the lack of 'knowledge' about audiology by the supplier although this gap was bridged by the CAS. In particular:

- leadership remained omnipresent within the solution development and implementation identifying knowledge gaps in not only the obvious areas but also the individual's softer, hidden ones which were immediately addressed
- it was the local department which provided the detailed understanding of the clinical processes which enabled the supplier to respond within an iterative process similar to a PDCA cycle
- this approach allowed the staff to be fully involved in the design and creation of the solution by giving time, having authority and recognition to their achievements
- a variation has emerged over time with users having differing levels of knowledge about what the system can do, how they optimise its use or bring out additional benefits
- this would suggest that the initial PDCA cycle no longer functions on a systematic basis. It may also have been compromised by the consensus approach required for improvements in functionality through the user groups or the unwillingness to share experience because of competition between sites particularly in England
- as functionality develops or people move onto other roles the knowledge transfer also weakens.

5.8.6.4 Knowledge of Psychology

Creating a work atmosphere that nurtures intrinsic motivation is fundamental to establishing innovation and the level of motivation and the findings identified:

- a pride in achievements was widely apparent with participants being able to highlight their part in the success of the solution
- that the tone within the department had been appropriate with just the appropriate level of leadership rather than 'command and control' usually experienced within project environments
- minimal evidence of extrinsic forces being at work during the products life cycle was evidenced
- participants were genuinely pleased to be part of the learning that had originated from this source.

5.8.6.5 Other Process Improvement Techniques

The findings concluded:

- that no correlation existed between the departments actions and that of considering system constraints (theory of constraints) nor the use of statistical analysis of variation (six sigma)
- an emphasis on flow of work through the department initially gave a possible insight into the use of lean methods but on closer comparison the 'value added' steps in the process were probably no more than normal process mapping considerations with value to the customer considerations (patient) at each step not being a factor in the design
- by future proof designing it did simplify the process from a paper based one, reduce variation by providing one way to work through the system, and has seen improved services over time developed in small iterations rather than deep analytical studies

- the technology solution did reinforce Jidoka (in a service environment this could be translated as intelligent systemization) and was presented to users as a standard way of working
- early gains in performance were made at the time of transition from paper to digital but there seems to have been minimal appetite to bring further sustainable change through ongoing initiatives such as lean.

5.8.6.6 System Thinking

There were elements in the approach which were consistent with ST and using a comparative table (Seddon, 2005) it was possible to these map attributes across a continuum and where appropriate demonstrate if the position had changed over time:

- the strongest ST component was the attitude to supplier where both the department and the supplier have derived significant benefit from a spirit of cooperation rather than contractual relationships
- marginally less significant was the design centred on the flow of processes for the future way of working which was supported by iterative development closely involving prospective users
- allied to this was the software which allowed decision making and approvals to be made by the clinician thereby improving the processing time. This basic process did not really change over time and did not take place under a formal project methodology
- design, development and deployment were assisted by motivated staff complements who were encouraged to participate and embed the change into their way of working early in its transition

- the process and its measurements were originally designed against a purpose but gradually moved towards being used to manage activity forecasts, assess productivity and compete within the wider organisation for restricted resources
- as governmental guarantees over service levels became more prominent the design and improvements became less about what customer thought mattered and more what was targeted by national government
- the original management ethic to implement a system to improve the outcomes was gradually overcome by the need to manage budgets and obtain value for money from resources deployed to the service
- the CAS took his vision and ensured a solution was discovered, designed and deployed which from a national perspective was a bottom-up approach
- this confirms that there was a bias towards a system thinking approach in the early periods of development but over time the direction of travel moved away to a more central position on the continuum.

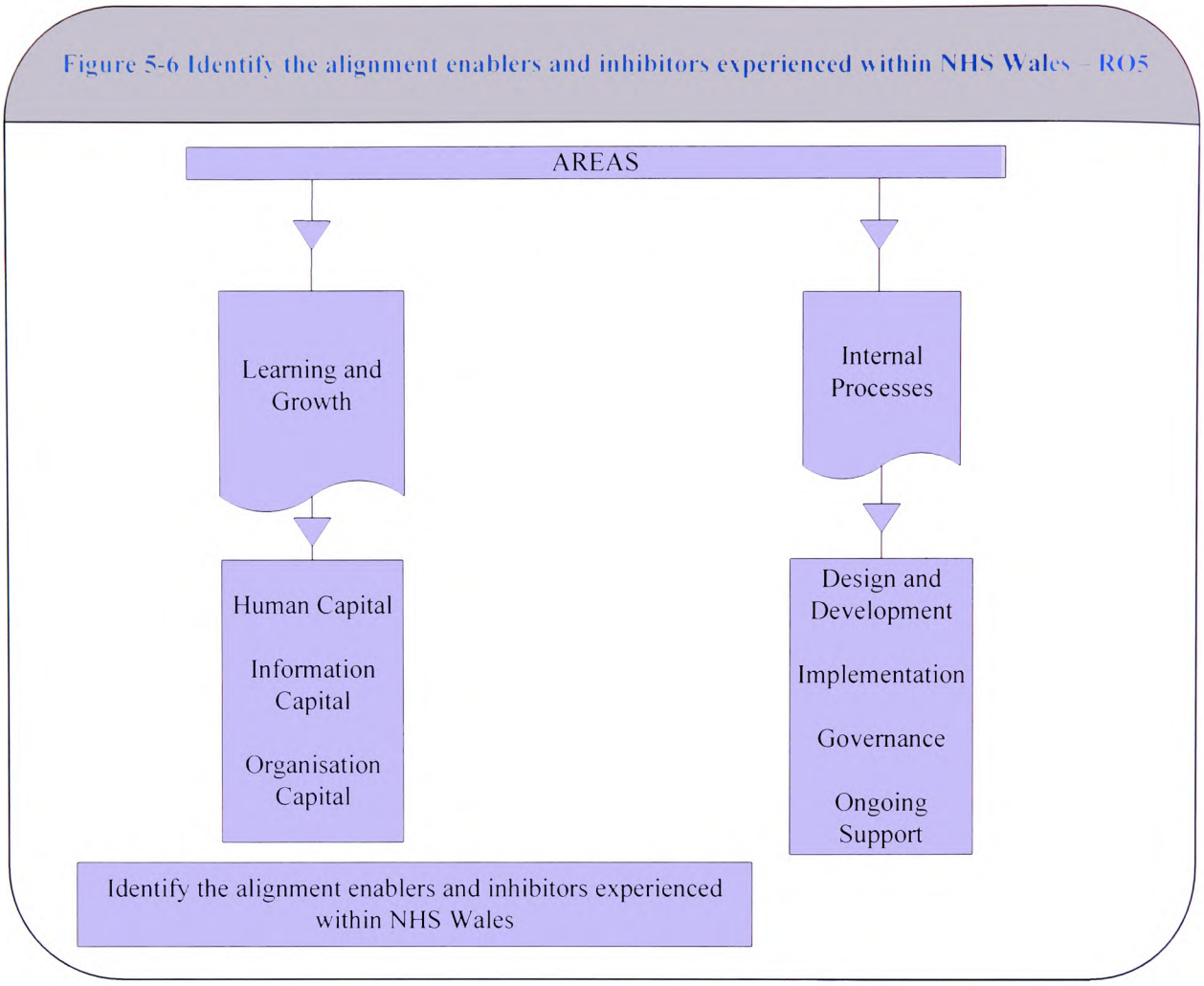
Further research will be required in the future to see if this direction of travel continues towards a more command and control approach perhaps driven as part of a nationally integrated strategy where there exists a danger that such bespoke software is likely to be a low priority within the wider informatics environment.

5.8.6.7 Process Re-engineering

Although reference was made to the importance of process the introduction of digital hearing aids at the time of the solution deployment already provided the lever to bring innovation into the new way of working. Therefore although it assumed similar characteristics as described by Hammer and Champy (1993) this was not as a result of the methodology being applied to the situation.

5.9 To identify the alignment enablers and inhibitors experienced within NHS Wales – RO5

This objective considered the identification of alignment enablers and inhibitors experienced within NHS Wales within the case study context. The main themes are presented in Figure 5.6. This section identifies alignment enablers and inhibitors experienced during this period in the life of the solution within NHS Wales. Enablers can be described alternatively as supply the means, knowledge, opportunity, or make able. Inhibitors can be described as restraints, blocks or suppressors. The two ends of the continuum are consistent with each other in that if an enabler is not present it becomes an inhibitor and vice versa, the outcomes of the interviews are therefore recorded with such a linkage. The numerous components are grouped into a BSC format (Kaplan and Norton, 2004d) which provides a framework to illustrate how strategy links intangible assets to value-creating processes. There are four perspectives but the following sections focus only on the latter two perspectives namely internal process and learning and growth. The participants were able to draw on many examples which can be construed as enablers to the alignment of the solution to the business need.



5.9.1 LEARNING and GROWTH

The Learning and Growth perspective provide a framework to consider their importance as elements of readiness. They categorise these areas as: Human Capital (which jobs) focussing upon availability of skills, talent and knowledge; Information Capital (which systems) considers availability of information systems, infrastructure and their component parts; and Organizational Capital (what kind of climate) which considers culture, leadership, alignment and teamwork. The responses from participants are structured into these groupings.

5.9.1.1 Human Capital

The following availability of skills, talent, and know-how were identified in the interviews with participants.

5.9.1.2 Skills

"I think if we just put it into a department where they didn't have the skills, the first time that something happens everybody stops using it, they go back to the paper and then that's a problem" (P3).

One of the first areas identified was the benefit of having someone with a good technical understanding which had manifested itself in a number of ways and on a wider basis the participants were keen to point out the risks of not having that support.

"I think we were lucky or maybe it's not luck because (the CAS) set it up so that we had somebody here that was technically able to help.. I think having an IT person on hand that understands it and can come immediately when it's a clinical system is crucial "(P3).

"then the backup was there, technically if there were any problems and issues because he had that knowledge ....and I think ..that that's massive to the success as well" (P3).

This was supplemented by the deeper involvement of clinicians in the development and ownership.

" I think it's clinician involvement and ownership really... clinicians can see a clear advantage of using the system ..its not something that they have to use to provide data for somebody else it's just built into the workflow .... you can definitely see the services that have had strong involvement from a clinician that's got some idea of IT they're the ones who are using it most effectively" (P4).

Reflective responses identified that some skills were absent during the early days and had to be developed over time particularly in the area of data extraction, analysis and publication.

"that's partly because there was no real understanding of how to get information out of audit base that a health board or PCT could use... and that's what I've learnt really because I didn't have very much understanding of databases and the way they work, table relationships and all that sort of off stuff... that's something if you're doing complex reports you have to learn about... " (P4).

The participants highlighted a good range of skills which were available to the solution design and development where additional support would have assisted in providing an enhanced outcome.

5.9.1.3 Knowledge

"we had someone who was clinical ... had a good handle on IT... not necessarily an IT person but understands technology... was able to communicate with the IT people when there was an issue clinically that needed to be resolved and was able to understand the language of the clinicians because she was an audiologist as well and could train them and teach them all the time how to use it and how to use it properly and I think that's critical to the success" (P3).

"whoever is driving it you've got to have them to have the knowledge"(P5).

The range of knowledge brought into the team when developing the solution was outlined in earlier sections and are not repeated but key elements were identified below:

"... because I think any clinical system you need a clinician who's interested at the very least ... who can say yes that's right - that's wrong because at the end of the day you know .....but actually getting the system to work properly and getting and making it easy for people to use is another thing altogether and you need a clinician to provide training and direction for that sort of thing "(P4).

The interviews highlighted that skills were also backed up by a good level of knowledge from differing individuals across a number of discipline areas namely: IT; clinical services; teaching and training approaches; process analysis; and problem solving.

5.9.1.4 Information Capital

> *"Amazingly reliable in terms of robustness of system ..... because it was using a sequel database and quite an expensive centura engine... it was incredibly robust you never lost any data" (P2).*

In this section the availability of IS, networks, and infrastructure are considered to ascertain what effect they may have had upon the solution. The positives here were the underlying technology. Having a robust product which was widely acclaimed and accepted within the community meant that an all Wales approach to digital hearing and use of the same underlying technology was easily achieved and aided standardisation in the initial stages and future development.

> *"my colleagues elsewhere in Wales didn't need a lots of persuading about the attractions of an integrated information system"(P6).*

> *"... if they haven't already bought audit base they bought it and installed it so from an all Wales perspective everybody has that same system which had been tried and tested and so therefore there is a Wales audit base user group and from that point of view they tend to request things as an all Wales sort of development, if you like, which I do think helps" (P5).*

Despite the success of the solution over many years a reflective review has identified some items which were not evident in the early stages. The first area was over a lack of standardisation.

"we procured the same system across Wales but we've all got separate databases ....so although I am saying I'm arguing for some flexibility.. that has caused to some extent some difficulties because where there has been some flexibility people have gone off and used it in different ways .. so when you then try and go and compare between centres..... that might be an issue with, for example, at a national level ... it becomes more difficult because people are using it different ways..." (P6).

"....they've got different appointments symbols for different things.. they are in different places in the tables so you can write a report to be run on different systems but it won't give you the same results... which makes life difficult... the only way forward is to design a new database, agree on a new set of symbols that everyone is happy with, agree the pathways and then we're going to pay to get the three patient... all the information from three databases ... into the one so we will start off with a brand-new database that everyone is agreed on, the whole service that's what I'd like to happen across Wales really "(P4).

This was partly due to a lack of integration with other systems but also to do with the ease of configurability.

" ... I think the biggest negative is really not having a link to PAS so that .. its one of the pains when you get a new patient in you've got to enter their details into audit base and that... that for me is our biggest weakness ...one of their IT guys had managed to write a an interface so they've got some.. a crude PAS so they can update demographics, date of birth, and whether they are flagged as deceased s or not ...there's ..... lots of stuff updating GPs and things.. .. GPs move about all over the place and its quite difficult to manage ...." (P4).

"...the English modernisation (MHAS) and the Welsh modernisation (MASW) missed out when they specified a system they didn't define ..a dataset that ...a standard dataset that couldn't be modified you know .. like the top 10 procedures or something" (P4).

The ease of configurability was a factor which occurred almost at its inception of the relationship with supplier being incredibly flexible.

"it turned out that the next customer we got very hard different requirements and different views as to how to operate and then we ended up with three different versions for the Danish market, three different versions, they were more or less the same they were tailor-made for that specific hospital site ..... In the beginning we said yes to everything" (P1)

The participants were full in their praise of the solution and in particular its robustness. This was a fundamental building block towards the wider and rapid acceptance of its use by the department initially and later in other sites. The benefit of hindsight identified that a more structured approach to the implementation of the solution would have assisted standardisation across the different installations although this highlights the lack of recognition around system boundaries referred to earlier. This was a consequence in part of the ease of configurability and is traced back to the early days when the supplier was keen to be responsive to the clients.

5.9.1.5 Organisation Capital

The success of a strategy can also depend upon the values, culture, leadership and team work of those involved and this section examines the responses from the participants.

Values

"staff felt very much more proud of the service than they ever had done before because they felt they were... that they had a truly scientific feel about the place instead of being

a bit more sort of old-fashioned.. it just felt modern .. so I think that there was a ... very powerful... I think slightly underestimated by some people but a very powerful feeling, of you know, we're on the move here really..we're cutting edge... we are providing a brilliant service" (P4).

The department was fortunate to have enthusiastic staff who had a pride in the service they wished to offer and within some of the responses this stood out.

"I think they realised that actually if they were going to get it to work anywhere they were going to get it to work in our department because we had a number of people who were computer literate and quite keen (P2).

"I think the patients noticed that... in subtle ways.. but it makes them feel more confident about any advice that they're getting from clinicians and things you know, yes this is the right place to be" (P4).

"raising the profile of the Department, I mean (the) CAS was already a nationally known scientist within audiology... but I think..because we were the demo... the UK demo site and helped to make audit base a national audiological tool" (P5).

An established attitude of delivery of a service to patients was prevalent throughout the department built upon self-confidence that what was being provided was slightly improved than just being appropriate. This had its roots in the leadership of the service which is discussed later.

5.9.1.6 Culture

"in Wales we were very much a trailblazer in doing this nobody else was doing it so we had almost a free rein to carry on and do this. In Wales there was an easier political climate to convince government officials and politicians that we needed

investment in audiology so we had a program called modernising audiology services Wales which basically set up services and departments to be able to issue digital hearing aids and as part of that programme there was a software procurement for audiology patient management systems to enable us to program hearing aids" (P2).

The culture at that time within Wales was very different to the more restricted current situation. The department had an open approach to new initiatives. This ranged from touting round ideas at conferences with professional colleagues (P2), sharing potential opportunities through roadshows to other sites (P2) and extolling the benefits of working with the audiology department to suppliers (P2). Participants identified the importance of cultural change which had been required by reference to the alignment of the way that the software was supporting the user and how this was a necessary part of any success.

"doesn't matter how good your product is if you don't have a department that's wanting to adapt, use and particularly change the culture and the way of working then you're on a sticky wicket" (P2).

Participants demonstrated as part of their interviews an attitude of wanting to push forward all aspects of the service and hinted at the frustrations which have been brought about by a more performance management discipline which could hamper this important cultural characteristic.

5.9.1.7 Leadership

"it was also that was critical to the success... that whoever is managing it was really, you know, bought into it, believed in it and made it happen for everybody all the time... so that the other thing that make it a success ... and that was very much (the) CAS "(P3).

"again I think that's about leadership about carrying people ... "(P2).

It was clear that one of the main enablers was leadership and all participants clearly referenced the role and drive of the CAS in this area whether it be as a departmental manager, audiology professional or visionary leader. It also occurred at different levels and the following quotes reflect the esteem that the CAS, as leader, was held.

"you could say to (the) CAS just explain this to me in ABC.. and I think he's... he's able to do that and he can sort of get his point across to any level and... and you sort of pick on his enthusiasm if you like" (P5).

"when we first implemented ... one of these .. resistant person who worked for me... and (the) CAS just sat there with her and just spent time and just gave that time and actually got that person on board at a time when everybody else was running around frazzled... ...he just sort of spent that time and just sat there on reception for about three days with that person and just giving them their confidence to deal with it and so he sort of identified that's what was really key to the success .... getting that person on board was really key to the success" (P5).

"and she still remembers that to this day that I came and sat with her for two days and helped her out and that sort of thing changes people's perception ...actually putting effort and time to where you need it..."(P2).

" looking at it from the very beginning it is the case of seeing something... ..... similar...he knows what's happening in the world of audiology.. knows things are afoot... things are changing.. that's how it works elsewhere ..... and we are developing

it and.. we need something like that in the UK .....the starter of it all is ...you know without him it would have been a while until we had anything" (P7).

"(the) CAS's vision about this was that he wanted it to sort of link in with... the hospital system and to get information, you know, to get that open architecture between the PAS system ... the hospital system admin and audiology" (P5).

Clear communications, translation between technologists and clinicians were a key feature referred to in many discussions with the participants.

"I've now worked in other areas where they don't have that and it's really hard to get people to adopt the software" (P3).

"In the discipline we are in, audiology, is quite scientific base so the language between ourselves and the engineers was a lot easier 'cause we understood the sorts of things they were talking about so I think that make life a little bit easier" (P2).

Whilst discussing this with the CAS it was suggested that a number of products that are launched tend to be led by the clinical champion but it's the 'great and the good' whereas what was described to the researcher mirrored more of a bottom up understanding whilst at the same time had someone who's been able to start to lead its own discipline in a direction that still maintain that link to the ground floor yet is able to influence at a national level.

"I think there was a bit about that leadership stuff and I had a team that was you know ...they were all a team who wanted innovation were striving to do more and this was one of the products that allowed them to carry on and do that.. no doubt that my

background and my influence made it easier because I was able to share a vision that people didn't see that I was able to bring them along" (P2).

In a final point in this area one participant drew attention to a significant difference about how things have since changed in the leadership of projects.

"it's very common nowadays to have people lead you in projects with people that don't actually work in that environment or don't have that hands-on experience so and so therefore don't really understand the difficulties that that person is having "(P5).

The success of this solution was very much predicated by the vision, drive and enthusiasm of a leader, in this case, the CAS. These characteristics were infused into the participants at all levels and with great skill and psychology through identifying and intervening on key issues and critical points where the deployment could have faltered between success or failure. The success is almost directly related to this key enabler which differs when compared to other comparable transformations.

5.9.1.8 Teamwork

"we also had networks of an all Wales heads of service so there was a lot of feeling of all Wales working together in lots of things and their were ....other people were willing to accept, and you know, what we learnt in the North they were able to .. willing to take that on really "(P3).

Kaplan and Norton (2004d) refer to the strategic potential being released through the sharing of knowledge and staff assets. Within Wales at this time the foundations had been built throughout the principality. The CAS outlined that Wales was a small community who knew each other, met regularly and with the chief scientific adviser where it was decided to modernise audiology services (P2). This had been based around a really good network in

Wales generally around the scientific advisory mechanism for WG and included an audiology standing specialist advisory group (P3). Such close links aided the sharing of knowledge and experience which in some cases resulting in helping other sites to train and implement the auditbase solution whilst assisting the admin teams to set up the letter templates (P5). However learning from each continued after the initial implementation as sites adapted became familiar, used the solution differently and in better ways without recourse to manuals (P3). However not all parties made the most of this knowledge and paid the price accordingly.

> *"I've had several people come round to see what we do and I've given them advice on everything... they've gone away and then they've come back two years later .....looking at the same thing again because they're gone away thinking we're not doing that we don't need to do that and they've done their own thing and come unstuck ..... but you think that's two years you wasted there ... "(P4).*

> *"I was IM&T adviser... and my job was supposed to be advising other sites on how to set up but people didn't contact me, I tried to make contact and people weren't interested...they thought we can do it ourselves .... you know it's easy and they didn't want to listen.... and I think that should have been more prescriptive when it was rolled out across Wales "(P4).*

Working together outside of immediate boundaries remained difficult with a propensity for departments to want it their own way. Despite willingness to share experiences and provide guidance a theme emerges where the necessity of learning through experience is still a greater draw than taking advice from those who have been through the transition process.

5.9.2 INTERNAL PROCESSES

Kaplan and Norton (2004d) state that effective and aligned internal processes determine how value gets created and sustained. Processes which are within the learning and growth perspective drive any strategy. It is important to identify the few critical processes that are most important for creating and delivering the improvements (customer value proposition). Each cluster of internal processes delivers benefits at different points in time and the following paragraphs identify key clusters of sub processes which appeared important to this successful alignment.

5.9.2.1 Design and Development Process

> *"the principal of getting programmers to program next to clinicians and prototyping things I think I would do exactly the same" (P2).*

The initial design objectives included some critical elements: for use by anybody in the UK not just the department (P3); robust data structure (P2); less intensive network architecture (P2); interface to HIMSA engine; a simple user interface (P7); and an integrated information system (P6). Any working product had to recognise how fundamental it was to the way of working as it would: affect every piece of work which was done and carried out (P5); a focus on the minimum dataset avoiding latency (P3); simple change over from a good manual system to the new electronic one (P5); logical approach for staff to search and use the functionality (P5). This suggested that the design was to be totally integrated in terms of the clinical workflow and was a point which was confirmed by participants (P4). The design and development required a close working relationship and was iterative in its approach. The supplier came over and looked at how the clinic worked (P2) and with the help from the department mapped all the various screens onto a big board to demonstrate how the department wished to work thereby designing in the intuitive aspects of the functionality

(P2). This included changing the perceptions around how certain functionality should appear with the aforementioned 'hairdresser' diary approach being one example (P5).

> *"And a lot of the software programming happened on the bench in the Department.. I mean an awful lot of modifications and wish list issues came about because the software programmers were sat with us and we would literally ring up Denmark and say look this ain't going to work unless this button appears here, we can do this functionality here, somebody would fly over bring a prototype, test it out.. it was the beginnings of being able to use FTP.. servers so (they were) sticking versions of the software on a server in Denmark, downloading it, sorting it out ourselves so it was a lot on-the-fly development that happened in that first year "(P2).*

The CAS believed that the system worked because engineers, software engineers, worked with clinicians and literally sat with all of the staff who were able to influence the product by stating to the supplier that their lives would be so much easier if it did this or that... upon which the supplier 'went and did it' (P2). Perhaps the key element which assisted the design and development of the solution was in its approach which saw detailed deconstruction of the existing solution to match the processes and new way of working and the rebuilding of this with the developers alongside the individuals acting as business analysts. They identified that the patient pathway included many stages and access points but believed that the solution must have user ownership and be the place to go to support this service (P4). By walking the developers through the process and considering that IT made a big difference (P3) and, although the starting point, the paper system was not to be replicated (P4). In some cases they were able to act on the departments less formal requests by providing solutions as part of other development work (P7). This approach enabled the department to reflect upon how lucky they had been to be able to influence what they wanted the solution to do, be involved

in the process of development thereby seeing a final solution which met their requirements (P7) although one participant suggested that a figure of 95 per cent was more accurate but had nothing awful omitted (P6). Such close proximity of the team with the supplier delivered successful and satisfying outcomes both initially and then in wider context.

> *"we were involved in making that, a software system that worked already, that worked for other services elsewhere, we were instrumental in making that work, for us, so it fitted, it just fitted what we did and that worked really well... "we could easily have had other software... to do the same thing that came out a bit later and although it looked a lot swisher ... and people would say on the surface, because it looked all Windows-based and ours looked a bit DOS-based.. but that was just the look of the front-end ...but actually the reason ours looked so old fashioned was because it worked for the way we think, it worked" (P3).*

The close working and rapid iterative development did have its downside and some of these initial issues were recounted by the participants as seeing the software ending up being described as 'higgledy-piggledy', 'buggy' and not well-documented (P2). This was more prevalent by the third year when sales increased when it became difficult to navigate around and there was a backlash with at least three quarters of national user group talking about it being full of bugs (P2).

> *"they were getting bigger as well they had more resource so they spent a lot of time freezing development and actually working on sorting out the architecture and the bugs and after another couple of years it was remarkably bug free and stable and as good as any piece of software that I have used in terms of reliability, probably better actually" (P2).*

In the end, the supplier brought in some specialist testers to remove the bugs and system 'hangs' (P2). The debates around local flexibility and configurability are again pertinent to record and these were recalled as part of debates around the functionality and data field. The issue has two extremes in that a number of the participants favour a system that's semi-flexible so it can be defined by knowledgeable people at a local level to define how fields are labelled and structured with potentially a designer's module (P6) to locking down the system to maintain integrity with limited access for only a few system managers (P4). Other aspects suggested that this approach lacked convergence of the solution with other IM&T strategies where more sign up from corporate IM&T services would have been sought (P2) and more joining up with the business requirements and limits of technology indicated previously in the WAN limitations (P4). Furthermore, a number of areas were highlighted which could have smoothed the transition. Initially the supplier was not conversant with the business area and how change continually affected the solution.

> *"it took them a long time to actually understand how audiology worked and then goalposts keep on moving as well ...so... the lag of getting something into audit base so that it worked ...by the time they got it in... things had changed again" (P4).*

The supplier needs to understand the business within which they are providing an enabling component. This includes not only the clinical workflow but also the integration within other systems or at least plans and abilities for later convergence. The benefits of a type of iterative development were evident in the discussions. Although early days in the use of server technology the benefits of close working with clinicians and developers was supportive to rapid development and a clearer solution for the users. This did however have some limitations later when more standardisation was required and the supplier found the support elements almost unsustainable. Product stability is a key factor which has proved

important and the acceptance of the product where a desire for rapid progress through iterative development can have a deleterious effect on the robustness of the supporting code. Therefore it appears important to build in and not skimp on the quality assurance processes of any development.

5.9.2.2 Implementation Process

The interview discussions over implementation issues brought forward some challenges which, in setting them out in the ways in which they were overcome, led participants to comment on how this led to the overall success of the project.

> *"..... implement something really major like this then you would want that day-to-day running not to be in addition for the setting up of that... that implementation. It's all about staffing and numbers and resources ...it would be helpful to have maybe some additional help to actually take care of the day-to-day workload"(P5).*

Initially is the decision over how much legacy data will be available within the new system and to what level of granularity. The manual system has significant amounts of indexed record cards containing patient data on hearing aids, demographics and histories (P3, P5). Inputting was a time consuming task aided by additional short term admin staff (P4), staff working flexibly inside and outside working hours rewarded by cakes for progress from the CAS (P5). The completeness of the existing information was also key and as in many projects to achieve these criteria the quality of data was reviewed as it was transferred. Starting with the new patients (P4) and current histories of those using the service at that time (P5) (who were entered onto the system first) they worked their way backwards where issues of data quality arose which required cross checking to the PAS to ascertain whether the patients were still resident or in some cases still alive (P5). The role and importance of the varying stakeholders were highlighted by reference to the original deployments as well as those

witnessed with other sites outside of North Wales where some were more IT led who had no knowledge of the audiology service, set up the hardware and left (P4). The departments also highlighted that skills were enhanced by training before and after (P5) both in the solution but also programming the new digital hearing aids (P6) being important to allay fears of making mistakes, missing something in the appointment process, building up confidence in the new system after leaving the old one (P5) and motivated and on-board (P5). Over time familiarisation took away the need for training and the old ways of working were given up (P7) signalling the start of seeing benefits.

> *"the other advantages is that once we'd sort of off settled down.... it's in probably in year two when things were really stable and you could rely on what was in audit base and we'd really got used to using it properly... "(P4).*

> *"I think if the user can see actually that this makes it easier for (them) to do (their) job then they are going to be on board and they will be after the initial hurdles..... rather than just saying I want you to go into this like this because that will help other people ... it needs to help them." (P6).*

> *"I think the fact that how the system worked there was originally yes there was some... a little bit of reluctance if you like to move away from what we were used to.... but I think as soon as we found when using it is a bit more... and again that's just with familiarisation with a little bit more sort of training about the... system ... we felt we could give up our old ways and get rid of all those things. "(P7).*

Tailoring implementation support to local circumstances is always a challenging mission. The key issues here suggest a need to be clear on what legacy data is to be transferred, its granularity and quality; which systems you will integrate with or plan to integrate to; what interfaces with equipment are required; which resources need to be involved and clarity of

their role in the context of the strategy and deployment; training before, during, following until familiarity is achieved; and ring fenced time to implement in a considered way rather than a part of the day workload. This latter part will assist in releasing benefits.

5.9.2.3 Governance Process

The governance around the initial project was described as interesting (P2). Unlike more current day projects this development was undertaken within a relatively unrestricted environment where development work could be undertaken without asking for permission outside of the department (P3).

> *"I was in a position where I was able to do my own thing without too many people stopping me at the time... we didn't have to write big business cases or try and get resources from local IM&T...it was at a time where it wasn't so much IM&T control as there is now, you could do things without having to justify and write copious amounts of protective documentation around things" (P2).*

In addition, no Project Structure was set up locally but decisions were easily made through other mechanisms. This flexibility extended through to the contractual arrangements where, unlike today's shared service professional departments, no procurement expertise was involved and the CAS negotiated directly with the supplier (P2). The initial project was successful but the service was changing and although involved nationally the CAS was unable to continue the process in a light touch governance arrangement. He was therefore unable to see through his vision personally into a wider Wales as the modernising audiology services in Wales was put through a formal procurement route and he was asked to step out of the procurement due to his close relationship with supplier (P2). As all Wales became aware of the product a much firmer governance structure was put in place to implement a wider modernisation agenda. This provided a defined scope and link to resources (finances).

5.9.2.4 Size and Scope

Drawing upon the experiences one of the factors considered important was the size and the scope over which any governance needed to be overlaid. Wales was described as about the right size to influence a need to tailor a product for the country and had good links around its ability to obtain sign off and drive through the implementation (P2, P3). This contrasts with England where they had more services and great difficulties in agreeing to proceed to tender for one system (P3) and led to a more fragmented approach (P6) affecting the supplier as reported earlier in RO1. This suggests that Wales was just about big enough to provide some governance and consistency in the procurement approach whilst England suffered by being to big and therefore fragmented.

5.9.2.5 Financing

The provision of funding remains critical to any investment whether it be a replacement or new innovation. The criteria over funding only one system (P3) through the modernisation in Wales assisted the procurement, site standardisation (P5) and deployment.

> *"we didn't get any resistance from colleagues partly because we were saying here's the money for it as well ...we were running a project which involved dishing out I think its about £1.5 to £2 million in 2001 monies.. and we needed to do that fairly... needed to be using the money wisely and distributing it fairly ... but you know... it's a win-win scenario really" (P6).*

The modernisation strategy brought about a different approach in that money was not just targeted at the technology but also the infrastructure, the environment and the training (P6). So the project was much more integrated in terms of key interdependencies. The development was undertaken within a relatively unrestricted environment with no formal project structure.

Decisions were made locally and no external professionals were involved to oversee the activities and commercialisation. Later more formal approaches were put in place at an all Wales level which remained consistent with the size and scope of the activities. This compared favourably with the challenges which beset England in a similar programme. Such an integrated modernisation approach, focussed just upon a specialist area, assisted the procurement and deployment within the whole of Wales. A consequence of this, which was supportive, was that the funding was not just targeted at the technology but also the infrastructure, the environment, knowledge and the training.

5.9.2.6 Ongoing Support Process

A more retrospective review of the solution has, over time, concluded that it has proved to be a continuing success in transforming the audiology service during the ongoing support phase.

> *" its sort of lasted the time really because sometimes you can have systems and they just become outmoded and things just become... whereas audit base has continued to develop alongside and has continued to work" (P5).*

The establishment and communication within user groups to facilitate changes and enable the service (P7) coupled with the supplier's keenness to keep a close attention to the developing nature of requirements has ensured its longevity with long term stability without major changes (P7). The vendor was a key part of the success over time and survived the transition from a start-up product, developed market share when it was sold to a larger player in the hearing aid world, and finally back again to the original owners. Things worked best in the early and later stages of this solutions life cycle. Originally the supplier faced a number of perceived shortfalls around audiology knowledge, UK marketplace (P4), rapid demand in the marketplace (P4) and some of the training (P3) but like the QA reported earlier in the chapter, put commitment behind the issues and resolved them. These initial QA problems with

software bugs prompted the realisation that this aspect was critical to its future with one hour of QA being put into every two hours of development (P1). Such issues were reflected in a forgiving way rather than more confrontational aspects of tighter governance experienced in latter day service boards now common place within Wales. The change in the ownership did bring relationships into a more commercial setting with discussions moving into this more usual customer requirement and supplier price approach to working (P7). This more different relationship coloured the direct support issues where responses over system performance were more evasive (P7) and put the onus of proof back onto the department. The move back to the original owner whilst welcomed did not come without its problems particularly as the company looked to improve its application release/version upgrades. The necessity of having a specialist within the department was very important to support upgrades, testing (P5), expert advisor to both company and department (P3), and problem diagnosis and resolution (P7). This has required considerable time to recreate the problems and a strong personality to ensure a satisfactory resolution to issues. The danger always existed that as the solution moved outside of Wales then requirements for change became subsumed into a consensus making process. The solution has benefited by the close working of users through active user groups in Wales where site representatives get together and communicate their needs (P7). This has been successful with most requests being met over time (P5). In the early days the meetings were a bit tense over the issues outstanding (P2) but huge efforts by the company were made following demands by the user group to address performance and software issues. The relationships have since settled with the ongoing support process and user groups being more productive, a solution which is stable and product life cycle being sustainable (P7). The risk exists that with more and more services, individual trusts and health boards taking the solution which results in additional people being involved with the request for changes will inevitably see an erosion of the Welsh influence (P6). In addition, the future

support and working relationships are likely to be challenged due to the introduction of a competitive environment within England. This may affect Wales by more diverse requirements being demanded in England or alternatively strengthen the Welsh control being a more stable and consensus influence over the development and changes required. Already some aspects of development have stalled as whilst a collective interest can approve changes they have faltered as the uptake of the changes remains lacking with a recent example being around paediatric models (P7). Looking to the future, as the product has been so successful, concerns have been raised over the likelihood of a monopolistic situation occurring with the supplier. In the first instance the benefits of being a 'first mover ' were recognised and considered well worth the additional effort.

> *"we had great influence when we were first in there, when audit data was small, they were trying to get into the UK, they were trying to get into the UK market. only one or two other centres in the UK that had the system and there wasn't .... you know their view that modernisations (was) coming up.. this could be big business for us so they were keen to please "(P6).*

However, the future challenges which have been raised come from two sources being the supplier and from English customers.

> *"the other thing that's happened over time, is of course, the companies have got market saturation .. ... not just that there's lots of people saying what they want now as its revised and improved but the market's saturated and the providers are then in a very much stronger position because they sold you a system and you would think they can't expand any more but they've got you and then the barriers for them losing that are... your ability, realistically, to go and change to another system (when) there's only two*

products on the market in our case ... you do need a good number of potential suppliers and systems out there that can do... deliver ...it's much healthier.." (P6).

"obviously in England you've got a lot of sites where the audiology Department is almost if you like being put out to tender, so you can use anybody who is qualified to provide.... , sites that are next door to each that are other possibly all competing for the same work ...which then possibly may mean that they are a little bit less likely to want to communicate with each other about what they want and how they want things for them to develop... in Wales obviously... we are still quite happy to talk to each other and then that might make us more of the force than over in England" (P7).

In summary, the solution has proved successful in transforming the audiology service during the ongoing support phase and this has been assisted by the establishment of user groups. This, coupled with the supplier's keenness to keep in close attention to the developing nature of requirements, has ensured the solutions longevity with long term stability without major changes. Part of this success was to realise that quality assurance was critical to its future. This is still prevalent today with the danger of quick fixes being applied rather than a robust request for change process. The support has benefited by the close working of users through active user groups in Wales although as the product moved outside of Wales then requirements for change became subsumed into a more consensus making process. Future support and working relationships are likely to be challenged due to the introduction of a competitive environment in England although this may benefit Wales. Overall the support issues could be affected by the likelihood of a monopolistic situation occurring with the supplier.

5.9.3 Importance of Findings to Research Questions – RO5

The CAS summed up his feelings over what enabled the success of the solution.

"So it was the right people, right political environment, the right management above me and the fact that I was probably in the right place to do it "(P2).

Key enablers, and some inhibitors, were identified which cross several areas which could be construed as readiness (Kaplan and Norton, 2004d)

- the need for leadership of the project who has skills to provide a good technical understanding supplemented by clinicians who are not only involved but have ownership of the outcomes
- other key areas included:
    - the ability to understand the extraction of data from the solution
    - its analysis and dissemination
    - skills were supplemented by a good range of knowledge across all those involved which covered IT, clinical services, teaching and training approaches, process analysis and problem solving
    - individuals who were themselves enthusiastic, had pride in the service they were providing, desire to help the patient and bring improvements through innovation
    - they were assisted by the service being built around a robust, stable product and underlying technology which was tried and tested. It linked to the new technology and digital hearing aid relatively seamlessly
    - the situation could have been improved had there been more standardisation in the data set and user interface as the product was rolled out across North Wales and beyond

- consideration of integration requirements with other systems primarily PAS would also have helped the efficiency of clinical processes as well as aligning the data quality process checks across the hospital systems
- confidence and belief within the organisation was high and an open approach to new ideas and initiatives led to a culture which supported a belief that they were trailblazers in their field
- although technology particularly around desktop and server devices were not widely available or used, the prevailing culture was supportive to those making a difficult transition to the world of technology supported processes
- changes were made in a more forgiving and easier political environment where individual departments had more room for innovation and manoeuvrability
- transition from paper to digital records was quickly established and became business as usual soon after development rather than a project with a detailed planned set of activities and go live date
- leadership was a key enabler and examples were widely quoted with evidence being present at all levels from the original vision, proof of concept work, design and development, implementation, and even direct support on the front line with users
- in addition, a leadership role existed across Wales with peers and contacts and networking with the WG at that time
- effective communications, facilitate a translation role between technologists, clinicians and support staff. This was a clinical champion operating at all levels within and outside the organisation

- willingness to share knowledge and experience through long term networking and later in the project direct offers of help with implementation. This was hampered in other organisations by some choosing not to accept advice or an unwillingness to change their way of working and such inhibitors would therefore be a key area to address in future projects
- design of the solution was, from inception, a design for everyone and not just the local environment. This was not totally inflexible and some local adjustments could be accommodated but the main clinical processes and interactions with hearing aids remained intact
- the CAS realised that to support the processes any solution would need bespoke software and standard data structure supported by robust network architecture. This required the specialist nature of the interactions of digital information to be integrated with a conventional approach to IM which in itself was recognised as fundamental to the successful ways of working
- the solution was totally intuitive and integrated electronically in terms of clinical workflow
- participants drew attention to the strengths of the back end with functional use being more important than a modern front end 'look'
- communication in the design process, outside of the department, was only inhibited by not considering the constraints of local IT infrastructure, or communicating with local IT
- a shortfall of the developer/supplier understanding of how the business worked was mitigated by the department who took time to consider the processes, screen and data shots in advance of commencing their work through the software development

- the development itself was an iterative process using the revised screenshots to describe requirements with all staff being able to influence development. These screenshots were based upon a deconstruction of the existing processes using visual techniques which recognised that some user interface representations were fundamental to the current and future way of working. This challenged the software design approach of some aspects of data presentation
- the continual communication during the development process was a significant element ensuring the success in the outcome with the supplier responsive to those requests. However, the downside which would require resolution in future developments was the need to ensure the software was assured, had no bugs, see a resolution to the difficulties of navigation, freely moving between process steps without the system hanging
- lack of on-going quality assurance and robust testing as part of development process had been an inhibitor
- other areas which were identified by participants:
    - was not the software installation, which went almost unrecorded
    - the consequences of planning the new processes to be underpinned purely by electronic records and not mixed approach of manual and electronic storage
    - the transfer of data from manual records. This area must be clearly identified and participants drew attention to not underestimating the size of the task of transferring these manual records over to the solution in order to obtain a single system economy

- the importance of building in data quality checks to the transfer across was highlighted and identifying resources to facilitate the transfer came from innovative ways
- the need for a balance for protected time for the project with the day-to-day workload. The success was recorded of how the staff worked flexibly on the data transition in between their day-to-day duties when opportunities arose in the patient scheduling due to patients not attending a clinic
- flexibility greatly assisted the merging of the project into the day-to-day business
- training was more in the context of introducing the new ways of working, motivating individuals in the new processes use, reducing fear of making mistakes, ensuring familiarisation and where necessary assisting on the front line where normalisation of the new practice could take longer with some individuals
- the participants refer to project structures being less rigorous than current practice which took a rounded approach in order to build upon original innovation with the project run with what might be now be described as no governance or at least light touch where the CAS had extreme freedom to act. This was built upon the politically aware leadership who had access to the key people in the department rather than protracted and diverse decision making forums
- events were driven by the vision and not based around an investment criteria or risk aversion, the department had the courage of its

conviction and such a leap of faith without tight governance would be almost unimaginable in the current climate

- the scope was contained and considered by participants as a good and therefore manageable size
- roles were allocated but not specifically in a recognised project format. This meant that many roles were dealt with in the department rather than relying on outsider 'experts' resulting in tighter and speedier resolutions and enhanced outcomes for the department
- from the initial development a more controlled yet wider deployment was assisted by central funding which supported new clinical devices, estate infrastructure, underlying processes and IM, and developed the staff knowledge base
- both parties were keen to build the knowledge of the business need over the long term to facilitate enhanced responses and support
- the product in functional terms had long term stability with limited major changes demonstrating that the design and development produced a solution 'right first time'. This stability continued during changes of ownership of the company which could have limited changes of approach and direction as the business directions were reviewed by the purchasing organisation. After the company was repurchased by the original owner the communication between user leaders and supplier/developers re-commenced
- the establishment of local product specialists who could act as interpreters between the supplier and business need was important and on occasions they found themselves as gatekeepers to the acceptance

of changes to the solution. In this role they indicated that it was important to be firm in the testing of the product and the release management and highlighted how over time they had learnt that a 'quick fix' became a longer term unresolved problems

- opinion was divided over the products flexibility versus control. By locking the solution down the increased control brings more dependence on the supplier particularly where there is no local product specialist. A more open approach reduces a constraint but can lead to a wider divergence which at a time of future consolidation can result in considerable work and change of practice
- the establishment of user groups who can work together to normalise any requirements and bring about changes more quickly go some way to mitigating the open approach but the context is limited to a more regional basis. This was particularly evident as the increased number of users across the UK resulted in wider requirements, more prioritisation and consensus challenges resulting in disappointment when local bespoke requirements didn't make the development lists
- the changing relationships brought about by politically driven changes could destabilise the user group approach and at a time when the number of products available are limited the concerns that a monopolistic supplier could emerge who becomes impervious to changes in requirements
- the importance of getting the product 'right first time' or at least 95 per cent right has, in this case, stood the test of time over years of support.

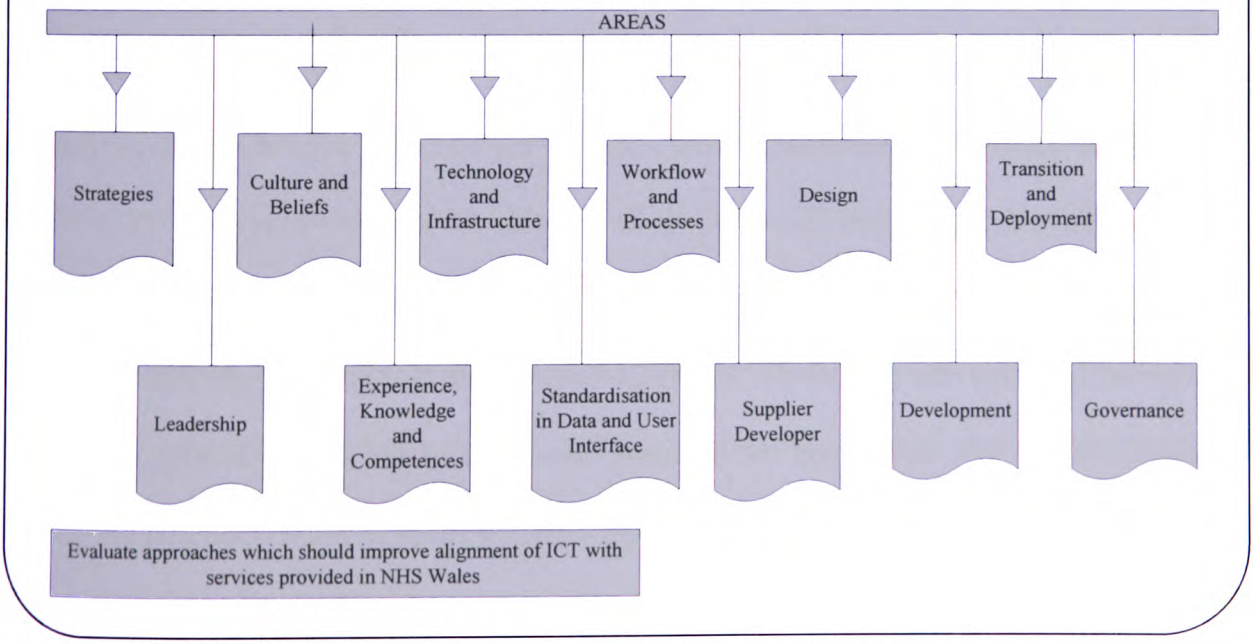
The final comment re-iterates that sometimes although planning and hard work can produce a virtuous circle events can conspire to enable a beneficial outcome

"we've been exceptionally lucky cause the fact of ...this is what we wanted it to do ...we've developed it... we've been involved in the process of developing it ..its doing what we wanted it to do but luckily because of the user group and because of how much influence... the Department previously had and still possibly has" (P7).

5.10 Evaluate approaches which should improve alignment of ICT with services provided in NHS Wales – RO6

This objective considered the use of approaches which should improve alignment within the case study context. The main themes are presented in Figure 5.7.

Figure 5-7 Evaluate approaches which should improve alignment of ICT with services provided in NHS Wales – RO6



5.10.1 Strategies

When considering alignment of ICT it should be noted that national strategies will influence not only the direction of future requirements but also the level of innovation and set the pace of service modernisation. Future strategic requirements can impact not only on NHS Wales's service provision but also suppliers in the market place therefore early engagement on the likelihood of changes and improvements will assist alignment potential. National strategies can be more effective where they are built upon local innovation which itself is derived upon a professional knowledge and understanding of the service. Local innovation, particularly in early stages of research, can derive from opportunistic events and the imposition of 'one way only' strategy can limit opportunity and create huge stop/go waves within the solution development cycles. Strategies should have a basis in the real world having assessed not only capabilities and capacity but also the knowledge existing within the service. They must recognise that they will also set the pace of the future modernisation by becoming the command and control centre to any progress thereby limiting local actions to procure or develop solutions. Assessments of capacity and capability and the extent to which freedom exists to meet operational needs during the strategic timeline within NHS Wales will be important constraints that need to be factored into the strategic plan. Knowledge of service requirements and system boundaries will improve the links between the strategy and the underlying investment objectives resulting in benefits for such an approach. This can be supported through good networking with a specialist advisory/reference group being an example of how this can be enabled. It is important to note that such groups must consist of those individuals who understand the business, the extent of the system boundaries and the future needs to which the solutions are to be deployed. Failure to build upon this knowledge of the service and the information infrastructure can increase the chances of slowing down the development and implementation or even lead to sub optimisation. It can also assist in

making sure that a solution already exists upon which the service can achieve the strategic aims. External impacts upon the strategy must be continuously reviewed as technology delivered in support of clinical services is one area can rapidly change in relatively short periods of time.

> *"I guess it's sort of hindsight really isn't it ... I think the service now is quite different to how it was in 2000... we've got, we've now got targets for pathways and things.... we never used to have those before.... so you need to measure things a lot more...". (P4).*

This may also manifest itself by the impact of other cross cutting strategies which can require changes of scope or produce additional requirements never considered in the original development and deployment plan. Such changes can erode the initial benefits or fragment the original vision which outlined the particular patient and information flows. Strategies, if amended, in order to achieve longevity, need to be regularly revisited with the current solutions assessed as still being fit for purpose. This is prevalent in the light of regularly changing and developing technologies with a need to maintain focus upon the vision for the service when the changes are requested. Strategies should be linked to quick transformations which mitigate the effects of external changes impacting on the design, development, deployment and ongoing use of a solution. They should avoid being too prescriptive (planning boards, ICT strategy) and focus initially on the objectives rather than the methods. The solutions can be normalised later. It should also consider the wider impact of change to ensure the delivery of benefits which in the examples reviewed included not only the ICT and processes but the estate environment and staff knowledge. At a time of significant change it is important to review all of these components. An absence of an IT strategy must not hinder the development of an approach and even if present must be one which is viable rather than a theoretical or abstract concept without a resourced plan to achieve its creation and

deployment. Similarly the business requirements need not be formalised into a local or national strategy in order to be valid with the professional view of requirements being ascendant. Strategies need to address not only the core solution but also clinical devices, estate infrastructure, underlying processes and IM, and developed the staff knowledge base. Funding for this was eventually provided, in the case study, at a national level as part of the modernisation programme.

5.10.2 Leadership

Throughout the interviews the theme of leadership came through regularly at all levels starting with the original vision, then the proof of concept work, solution design, development and deployment. It is important to have a clear vision and be able to communicate the business strategy, what was required to deliver this into a service environment, and to share this with the supplier. The leadership must be based upon a good technical understanding, professional credibility with peers, able to act politically with a large number of influential stakeholders at local and national level and supplemented by a willingness to push the boundaries. This is consistent with Bowens et al. (2010) who drew attention to the important organisational dynamics of leadership and change management. The communications must be clear within and outside of the local organisation and must achieve a dialogue which provides a translation role between technologists, clinicians and support staff. This must also be with clinicians who are not only involved but have ownership of the outcomes. Previous authors in this area have identified the influence of local, informal medical opinion leaders in the adoption of innovations in medical practice (Borbas et al., 2000) but this study has identified the extension of influence into the information and process aspect underpinning care of patients. It redefines the term clinical champion into one who operates at all levels of the organisation, within the system (process) boundaries, and with all

solution users whether undertaking back room or front line duties. The role continues as the external environment or the technology evolves in different directions.

5.10.3 Culture and belief

The creation of a work atmosphere that nurtures intrinsic motivation is fundamental to establishing innovation and the level of motivation (Deming, 1993). The organisation must also have an open approach to new ideas and initiatives (Tidd and Bessant, 2009) which are supportive of the difficult transition to be made to embed the change into their way of working early in its deployment and to depend upon technology supported processes (Deming, 1993). This will require a more forgiving and easier political environment where individual departments have more room for innovation and manoeuvrability. In this example, the trust allowed reuse of money received back to be used in support to the service. The right level of leadership and encouragement to participate rather than 'command and control", usually experienced within project environments, will promote the use of skills in design of workflows and user interface, problem solving, testing, training and general implementation to bring an all round positive and can do attitude. Responses from participants suggest that individuals themselves need to be enthusiastic, have pride in the service they were providing, a desire to help the patient and bring about improvements through innovation.

5.10.4 Experience, Knowledge and Competencies

Approaches implementing clinically based IS can benefit from having a mix of academically qualified professionals to give a good insight into the possible and an outside in perspective which can collectively bring a wide range of key core competences. This could be supplemented a good range of knowledge and personal experience across all those involved of which IT, clinical services, teaching and training approaches, process analysis and problem solving are key areas. Such experience counts for more rather than formal training being applied to the problems.

"So it's more, it's about having a fuller knowledge of the database structure I think before you even start, so you can make informed decisions about how you set things up and try and.. almost try and future proof yourself so you don't have to make massive changes down the line when things change."(P4).

The supplier, developer, project manager all require an understanding of the service and processes being addressed brought about by an induction period which includes working within the department that in turn should reduce (but not eliminate) such shortfalls of understanding and knowledge. Linked to this is to allow the staff in the area to be fully involved in the design and creation of the solution by giving time, authority to contribute and feedback recognition to their achievements. Where expertise and knowledge is high then a more flexible approach can be given to their input.

"some of the things that as we have gone along from when we had the audit base in 2002 where we are now... had I got the knowledge I've got now the system would have looked quite different"(P4).

Over time, after implementation, the skills and knowledge of the solution must continue to be updated to reinforce the important interchange of knowledge transfer.

5.10.5 Technology and Infrastructure

At the outset, due recognition must be paid to the underlying ICT estate upon which the solution will be operated and where necessary agreement for intervention support by ICT professionals. In some cases it will be necessary to understand that the ICT infrastructure may lag behind the clinical solutions being provided to the patient.

"everyone is doing VC (video conferencing) here, VC there ... and that takes loads of bandwidth and ...well you think ... there's a limit but clinical Systems should come first I think over that sort of thing.... it just isn't.. and some of these more remote sites is

absolutely desperate you can barely run audit base, you can run parts of it but the important bits you can't... so it limits what you can do with patients so you end up pulling stuff back again to main base which is just not what the health board wants" (P4).

Such time shifts are not visible within ICT Strategies and communications with local ICT staff are key to understanding this design constraint and participants indicated a desire to work more closely with IM&T (P2) and support more investment in the infrastructure (P4). A clinical service must be built around a robust, stable and reliable product with appropriate backup (P5) which is tried, tested, recognised as such by the users and supported by IT. The role of how much the department really does heavily rely on IT needs to be recognised and is one of the factors which can make a success of the implementation (P5). As changes to desktop, server and infrastructure occur then continuous review is required to ensure the solution remains in the optimum condition to support the clinical staff.

5.10.6 Standardisation in Data and User Interface

A key requirement which emerges over time is the amount of standardisation in the data set, user interface and reporting as the product was rolled out to other centres and then consolidated as a result of amalgamations. This could be addressed at times of major initiative implementations (P4). Such factors can influence the effectiveness and ease of reporting and comparison, consistent pathways in the service, familiar user symbols, and historic comparisons (P4). Opinion remains divided over utilising the products flexibility (P6) versus control of its configuration and development. The alternatives appear to be locking the solution down with the increased control (P4) bringing more dependence on the supplier particularly in the absence of a local product specialist versus the more open approach which reduces that dependence but can lead to a wider divergence when consolidated. The learning here might be where future consolidation is likely than more rigid controls should be put in

place to mitigate considerable work and change of practice. This area requires further study in other projects or developments. User groups can work together to normalise any requirements and bring about changes more rapidly and this will go some way to mitigating the open approach but the context can be limited to a more regional basis (i.e. Wales). Future changes in England and the disparity between regimes will affect this approach and should be reviewed as it develops. The 'commercialisation' of the NHS audiology service in England to private sector will increase this diversity. Where user groups prioritise there is minimal evidence over how the disappointment when local bespoke requirements which don't make the development lists should be channelled or whether alternative approaches end up being developed locally.

5.10.7 Workflow and Processes

It is important to deliver IT in the context of the service requirements, in the study it was a time of significant service and equipment change, and required development in proximity of the users to bring a step change in the benefits for the revised clinical pathway. This process and work flow benefit must be evidenced across the whole system and stakeholders. This can be delivered without the use of formal methodologies. The software should allow decision making and approvals to be made by the clinician, be totally intuitive and integrated electronically in terms of clinical workflow thereby improving the processing time. The basic process should reduce variation by providing one way to work through the system which does not need to change over time and if process improvements are required they should be developed in small iterations rather than deep analytical studies. In the current environment the process needs to move away from the paper record and support day to day operations, appointments, activity measurement and reporting within an integrated pathway with benefits from using the system emerging at many levels in the process, work flow and information provision. The revised processes should not provide a mixed approach (manual paper/digital

electronic record). The significant improvement of the development approach if intended for wider use needs to be replicated and rolled out quickly.

5.10.8 Supplier/ developer

Early assessments should be made of suppliers particularly around the product, their capacity to develop, the financial stability risk of protracted development timescales and to support over the long term (P2).

> *"In the beginning we said yes to everything" (P1)*

> *"I think the biggest lesson I learned was not to believe what the vendor says to you because they will promise you the earth when you are there about to buy something" (P4).*

In addition, longer term responses will be improved where both parties build the knowledge of business need together. The supplier must listen to the service and this will assist in understanding the long term vision. Enhanced communication and response will be forthcoming where the developer/supplier understands how the business works in advance of commencing their software development. This can be enhanced by establishing a role of local product specialists who can act as interpreters between the supplier and business need. Such a role is required beyond the early phases and will extend into testing releases, monitoring the resolution of issues, and providing the business perspective over the acceptance of a strategy or technique to overcome a defect or provide a set of quick fixes. The supplier must understand and deliver a robust and stable solution which becomes a significant competence to underpin the service and deliver operational, planning and performance information over a long period of time during which many changes in requirements emerge as the external environment brings new challenges. The core functionality should have limited major changes demonstrating that the design and development produces a solution 'right first time'.

Close working practices with the supplier should continue beyond any development cycle and as the relationship matures the development of forums or user groups will assist with communication and provide a 'heads up' to the supplier so they remain current in their knowledge and ensuring a suitable environment where they can develop the system together. Once the basic product or solution has been accepted following interactions taking place near the process, the user groups become important as the system boundary moves beyond individual organisational boundaries. This suggests that user groups need to focus on a whole NHS Wide vision for the system rather than components (local requirements) to be successful. However there are risks around the increasing number of differing requirements (P6) which need mechanisms or advisory groups to normalise. The intention is to build a relationship as a strategic partnership between the department and the supplier to derive significant benefits by having a large influence over the future direction of the product and from a spirit of cooperation rather than contractual relationships.

> *"it's probably about having long term relationships with... when you go and procure... thinking back go and procure over.... and define that long-term relationship so you're not in that situation where over time your ability to influence changes as ...other users come on board... "(P6).*

This may guard against some of the concerns that a monopolistic supplier could emerge who becomes impervious to changes in requirements and the critical mass of focused customers may lesson this risk. Issues of potential intellectual property rights did not form a core part of any relationship as the supplier developed the solution and it was difficult to justify a claim for ownership concerning the NHS input.

5.10.9 Design

It remains important to ensure that the scope is contained and considered by participants as appropriate and therefore manageable size but the design should be for transferable and not tailored explicitly to local environment (see advisory group above). Care must be taken as initial stage plans from the drawing board, the strategic business desk or geometrical models (Ciborra, 1997), diagrammatic or written change proposals such as IT Roadmaps or blueprints may lock out innovation. This approach which is reported was bottom up design rather than top down and was not subject to onerous governance or stifled as a result of local competition for resources through a business case assessment process. The design should identify the system to be supported and be centred on the flow of processes, consistent with the original purpose and promote the future way of working. It should focus on the process to be supported and not nice to have functionality but what is actually required. This focus must be maintained despite inevitable political interventions. If necessary deconstruct any product/solution to ensure it supports the whole extent of the system, can handle variation and ensure interdependencies are understood with barriers removed. This may raise issues over integration which will need to be addressed as the impacts may not be visible until later on when the system boundaries change. Consideration of the integration requirements with other systems (in the case this was primarily PAS) are key to helping with the efficiency of the clinical processes and will in addition align the data quality process checks across the hospital systems. The existing processes themselves may need to be deconstructed. However some components may have to function sub-optimally for the whole system to benefit. This is not to abandon the concept that making the process work for the whole country (P3) is a critical factor but neither should it be expected that the solution completely replicates the local way of working in support of their clinical pathway for services although the specialist nature of the interactions of digital information (e.g. hearing aid data) to be integrated with a

conventional approach to IM must be accommodated. Standardisation in terms of process and data structure is therefore important but flexibility for local adjustments should be supported. Recognition must be given to the users' requirements for the layout of the user interface which may be fundamental to the current and future way of working and that the strengths of the back end functional use may be more important than any modern front end 'look'. It is important to get the product 'right first time' in order to secure a consistent ability to keep up with changing service requirements. There is a special benefit of being an early adopter particularly in the design stage which can follow through the life cycle of the product and provide ongoing recognition for the centre. It allows the ideas to be developed into a reality and to interpret how a public health clinical system would need to work to support services in the NHS.

5.10.10 Development

Development should be an iterative process closely involving prospective users and is similar to what Tidd and Bessant (2009) describe as active users who provide ideas and insights and participate in beta testing. Continual communication during the development process will bring success in the outcome with the supplier being able to be responsive to requests. Such principles are similar to those now set out in Agile methodologies and summarised within the *Manifesto for Agile Software Development* (Beck et al., 2001). As part of this iterative working it remains important to keep the software assured, free of issues, and supportive of the process steps it is supporting. The communications should extend into the interdependencies.

5.10.11Transition and Deployment

There is some evidence to suggest that where possible staff should work flexibly on the data transition in between their day-to-day duties thereby assisting the transition of the new way of working into the new processes supported by the solution. This ensures that the digital record

is quickly established and becomes business as usual rather than a formal detailed plan of activities leading to a go live date. Part of any transfer of data from manual records must build in data quality checks and this area must be clearly identified as the size of the task should not be underestimated. Training should be more in the context of introducing the new ways of working, motivating individuals in the use of new processes, reducing fear of making mistakes, ensuring familiarisation and where necessary hand holding at all levels including front of house services. The experiences should be recorded and shared particularly where future deployments will be made in other organisations. It is incumbent upon these future sites to listen and accept the learning to reduce the unwillingness to change their way of working and other such inhibitors. Such knowledge sharing is also an important source of intelligence for the supplier.

5.10.12 Governance

Current governance places investment decisions in front of emotionally detached individuals who will assess the case upon its ability to save time and therefore money (P6). The governance regime in place at that time was at best a 'light touch' where the CAS had extreme freedom to act. Without a tight business case process and imposed resource constraints the outcome resulted in an investment which was not within a list of competing priorities or run as a corporate project. This suggests that each department should consider its own investment criteria and resources rather than bid against other disparate clinical services (other examples come from NHS Wales include Cancer services). In addition, consideration by IT departments and governance of that period was limited and therefore had limited impact upon any decision making in this solution with no detailed high level strategy at a hospital level. This did not reduce the effectiveness or longevity of the solution. Limited consideration was undertaken of risk factors where the department was more willing to accept risk when striving to achieve their objectives although the development risk was

focussed more with the supplier. High level strategies have a role to play in determining a direction of travel but it would suggest that at a ground level they are more guidelines than directives. This suggests a dichotomy of use between the tensions of top down and bottom up planning. The success of the solution also demonstrated that politically aware leadership, where the development is driven by the vision, needs access to the key people in the organisation rather than protracted and diverse decision making forums based around an investment criteria or risk aversion. It also challenges the current models of project management in that roles were allocated but not specifically in a recognised project structure. Such allocated roles were less rigorously enforced than current practice and took a rounded approach in order to build upon original innovation. This also highlighted the crossover of skills within the department which dealt with wider aspects of the tasks rather than relying on outsider 'experts'. This resulting in tighter and speedier resolutions leading to more effective outcomes for the department. The absence of a formal project team and manager; formal checklists around readiness; recording and treatment of issues as they were highlighted didn't seem to impact upon the progress or the quality of output. This approach continued with limited preparation mounted before implementation, with issues being resolved as they occurred thereby providing a flexible response to deployment. Limited best practice examples or models existed then and the end state did not include reflections (P4) on how the implementation had concluded. Any methodologies available to a department can be superfluous in that the interactions to achieve alignment may be self-evident and already known prompting the suggestion that methodologies are more useful where the numbers of unknowns or interdependencies are significant in number, size and complexity. Although the downside risk to patients was small, the service continued as normal, the restrictions put around current developments were absent with more emphasis upon having the courage of conviction and a leap of faith. This suggests that the level of governance may be related to the

size and scope of the solution. Where they are small, as in this case, then a light touch governance should be deployed.

5.10.13 Importance of Findings to Research Questions – RO6

A number of cross cutting themes emerge in addition to the detailed points set out above and themes include:

- management of change
- individuals skills and learning
- building capability
- leadership
- learning from doing and building experience with a framework to help this
- light governance to encourage innovation and progress particularly in times of austerity
- relaxing strategic straight jackets.

In the context of a very different environment the reaction is to consider prioritisation and strict approach to investment criteria. The environment requires rapid change of services at a time where this control is instigated and runs counter to its objectives. This is founded upon the notion that as resources become restricted firmer command and control must be in the ascendance. The work here suggests:

- that innovation and pro-active change is more likely under a lighter governance regime where the underlying service is the determinant criteria for investment

- this builds upon the need for individuals to bring their experience, skills and knowledge to the fore and be encouraged to innovate or bring pragmatic solutions to the changing environment
- individuals tend not to work well from methodologies or other people telling them what to do but respond constructively to opportunities for learning and practical experiences
- a framework needs to be put in place where individuals learn by doing rather than implementing someone else's solutions and would suggest a particular challenge for implementation of national solutions

As a small step towards breaking this cycle Table 5-2 sets out the relevant and important themes from the interviews indicating where they were positive impacts (normal type), had negative outcomes (italics) or neither (underlined). It is hoped that this will encourage practitioners to regard research as relevant to working lives and an important value worthy of sharing.

Table 5-2 Relevant and important themes for the practitioner emerging from the interviews

Key Themes
Leadership - at all levels / politically aware/ accessibility
Good technical understanding
Ownership
Data extraction, analysis, dissemination
Range of knowledge - all parties

Individuals - motivations and pride
Stability and proven solution, and infrastructure
Equipment links seamlessly
Lack of standardisation
Limited Integration with other corporate systems
Confidence and Open Approach
Supportive Culture
Forgiving and easier political environment
Room for innovation and manoeuvrability
Quick transitions
Project management light
Good communications
Champion
Networking with peers
Would not accept advice (other sites outside N Wales)
Unwillingness to change WOW (e.g. PAS for scheduling)
Design for all future users
Limited variation in main clinical process/interactions
Some local flexibility
Standard data structure
Digital information integrated with conventional approach to IM
Intuitive
Integrated into clinical workflow
Back end strengths > importance than front end look
Not embraced constraints of local IT infrastructure
Supplier not understanding of business working
Iterative development process and communication
Deconstruct existing processes [visual techniques]
Recognise fundamental aspects of user interfaces

Supplier responsiveness
Software assured and tested
Process steps clear and free moving
Not considering impacts of transfer of data from manual- to-electronic
Not reviewing the data quality of manual records
Not having resources to support both above
Training - hand holding
Light touch governance/ freedom to act
Scope contained/ manageable size
Built around insider knowledge
Depending upon outsider experts
Central funding for integrated [BSC] approach
Protect innovation
Having rigorous project structures
Long term partnership with supplier
Long term stability of solution
Requiring iterative changes after implementation
Local product specialists
No robust supplier testing/ release management
Flexibility vs control
User groups where common processes
Ignoring Political interventions - RTT /Market economies
Influence of local level to product development

Over time not only has the NHS seen the creation of information silos but also that of the professional silo where work is passed and prioritised against other competing requirements.

The learning experience needs to be available away from these silos and expertise built up in a wider body of individuals who can take aspects forward previously the province of the professional. This reinforces the need for leadership to achieve the visions and is required across the whole cycle of change and at all levels of involvement.

5.11 Conclusion

The above sections set out the detailed findings of the data collection phase in accordance with the research objectives set out in chapter three and the methodology in chapter four. They identify over the six RO the key findings presented in a structured manner. The following chapter will consider these findings in the context of published literature available in order to compare, contrast and draw conclusions.

Chapter Six - Analysis and Interpretation

6.1 Synopsis of analysis and interpretation

This chapter brings together the research aims (chapter two), the areas of enquiry following the literature review (chapter three), methodology of the study and selection of a research area (chapter four) and the findings from the longitudinal case study (chapter five) to inform the analysis and interpretation. As outlined within chapter four the analysis is presented in three distinct phases: firstly it considers and contrasts the triumvirates within this research being: previous existing knowledge (chapter two and three); the models and methodologies available to the practitioner (chapter three); and the primary research undertaken within this longitudinal case study (chapter five). The extent to which the results confirm or contradict the existing literature is then discussed. Secondly, it considers the areas of enquiry identified from the literature with the models and approaches used in the field by practitioners to produce a frame of reference suitable for use in improving alignment within the public sector environment. Finally, it considers the emerging themes from the analysis and draws conclusions for NHS Wales in the light of the research aims posited in chapter two.

6.2 A Triangular Analysis

The triangular analysis was introduced in the Methodology section (chapter four) to assist in differentiation of the findings from the research. The analysis commenced with data from three areas: the extant literature was presented in chapters two and three along with the available models and methodologies; and chapter five presented the case study findings. This gave the opportunity to undertake three phases of comparison: firstly, an analysis of literature with available models (model and methodology applicability); secondly, an analysis of models and methodologies with the case study findings (model and methodology usage); and thirdly, an analysis of literature with the case study findings (literature issues validation). This was encapsulated in Figure 4-5 within chapter 4.

6.2.1 Area One: Literature

A large number of prime and secondary references were highlighted in chapter two to set out the research domain and in chapter three, which considered the literature (all included within the bibliography), were earlier references (Johnson and Scholes, 1993) and later writers (Aritua et al., 2010) who highlighted the importance of strategic decisions whilst recognising that definitions have no consensus. It also noted a lack of agreement in the literature over whether strategic alignment was illusory, even inexpedient (Maes, 1999). Part of this concerns a focus on theoretical rather than empirical studies, but other aspects point to disagreement as to how alignment is best researched (Avison et al., 2004). Chapter three outlined and grouped six approaches to alignment being via: conceptual models; systems approaches and process improvement methodologies; a method or methodology; critical success factors; a performance management framework; or an Information Systems Development Methodology. The analysis commenced with consideration of both elaborations of the Strategic Alignment Model (Henderson and Venkatraman, 1990) extended by Luftman (1993, 1996), Figure 3-4 which was still the unchallenged model for business and IT alignment (Maes et al., 2000) and then later frameworks being: unified framework for alignment Figure 3-9 (Maes et al., 2000) which is a combination of the generic framework for IM Figure 3-7 (Maes, 1999) and the Integrated Architecture Framework (IAF) of Cap Gemini Figure 3-8 (Maes et al., 2000).

In the first consideration, alignment via conceptual models, the exploration of the SAM concluded that similar areas of the existing quadrant components could be brought together i.e. skills (organisational infrastructure and IT infrastructure); governance processes (business and IT); and the underlying processes (business and IT). Whilst it might have been appropriate in earlier iterations of the model to segregate these aspects the wider integration of organisations suggest that they could be viewed and managed together e.g. technology

underpin most business processes today, governance models cover all aspects of the organisation. It was also difficult to recognise administrative aspects as a key item but within the public sector this could be considered in the context of local and national service structures. This would be further tested in the literature and case study findings comparison. The additional components outlined within the GF, a derivation of the SAM, adds additional detail around information and infrastructure; a characteristic which should link the internal processes to stakeholder perspective (customer thinking); and further emphasis over core competencies which are recorded in Table 6-1.

Table 6-1 Supplementary Components identified within the Generic Framework

V Generic Framework
13. Information and Infrastructure 14. Customer Thinking – links internal processes to stakeholder perspective 15, Core Competencies – further emphasis.

The IAF enhances the view required by focussing on the integration of design between the Business and IT as iterative processes taking into account the vision, current architecture and design phases whilst identifying that specific viewpoints need to be considered (e.g. stakeholder perspective on security) and these are captured in Table 6-2. The Unified Framework (UF) adds a strategic, structure, operations element to the process perspective of design (Table 6-3).

Table 6-2 Supplementary Components identified within the Integrated Architecture Framework.

VI Integrated Architecture Framework
16 Integration of design between Business and IT – iterative process – takes into account vision, current architecture and design phases 17 Specific viewpoints – needs to consider special viewpoints e.g. security

Table 6-3 Supplementary Components identified within the Unified Framework

VII Unified Framework
18 Process perspective of design – add strategic, structure and operations perspective

In order to assess the quality of any proposed categorisation the analysis used some differentiation outlined by O'Brien (1995) which suggests two broad criteria be considered: clarity, is defined so that differences between them are fairly clear and must work in practice; and Utility, there must be some point to the categorisation e.g. does it provide insights or knowledge that are of practical benefit. Following an analysis of these models and frameworks (Appendix K) it is clear that they are limited, as stated, to being more frame of references (Maes, 1999) with limited evidence that they work in practice although the IAF from Cap Gemini may have been used within their consulting practice. As O'Brien (1995) states the problem with these frameworks is that anyone can make an abstract model but they

must help organisations to get clearer or more specific when making decisions particularly around types of applications or end user computing rather than being too obscure to have value.

However, the positives from this review are that the components contained within frameworks do indeed provide a frame of reference upon which to consider further alignment perspectives. This is particularly relevant around the four quadrants from the initial SAM (Henderson and Venkatraman, 1990) as elaborated by Luftman (1996) and the additional components outlined by (Maes et al., 2000).

The next step was to further consider the literature in terms of gaps identified or approaches challenged in terms of alignment. Although discussed in more detail in Chapters two and three it is worth re-stating that more collective recognition has emerged (Chan and Reich, 2007) which emphasize that alignment is a process rather than an end state (Parker et al., 1988, MacDonald, 1991, Niederman et al., 1991, Baets, 1992, Powell, 1992, Broadbent and Weill, 1993, Henderson and Venkatraman, 1993, Norden, 1993, Baets, 1996, Baets and Galliers, 1998, Papp, 1999, Rondinelli et al., 2001).

It is with this emphasis, that the next phase of the analysis of searching for alignment criteria focussed upon collating those key aspects to which writers refer as required additions to improve alignment and thereby instalment as a practical tool (Maes et al., 2000). At the initial stage it was not clear whether the collated aspects were additional domains, components to the original SAM (including the Luftman enhancements) or just clearer definitions of what outcomes a component must have to aid alignment. The review culminated in characteristics being extracted from the literature and set out in Appendix I citing the more detailed description and the reporting author. In summary, the analysis of the literature identified in Table I-1 concluded that, whilst the initial components from the literature were part of the

foundation, other authors had drawn attention to other factors that require embedding within any conceptual model. These were referenced in Chapter 2 but the main elements are set out in Table 6- 4.

Table 6-4 Supplementary Components identified within the literature on alignment.

VIII Additional Factors from the writers on alignment
19 Adaptability - not static alignment, capable of dealing with changes
20 Constraints and opportunities – consider human, technological, managerial
21 Dynamic process
22 Evidence Base
23 Linkage – between strategy and implementation
24 Measurability

The second considerations were those aspects predominantly grouped as systems approaches and process improvement methodologies. To widen the potential identification of factors the next phase of the analysis drew upon such writers outlined in chapter three who, although established within their own field of theory and practice, provided an alternative viewpoint to the business ICT alignment. Firstly, Deming (1986, 1993), introduced in Chapter two, described a theory of management focused on providing products and services which meet and exceed the needs of the customers of the organization thereby introducing and describing an alignment of customer, business and technology. Other authors who have made significant and original contributions to existing theoretical thinking allied to aspects of alignment included various theoretical foundations such as: Lean Thinking (Womack et al., 1990, Radnor and Walley, 2008); BPR (Hammer and Champy, 1993); TOC (Goldratt and Cox,

2004); and Six Sigma (as described by Leach, 2005) although many have their roots within Deming's SPK. Osama (2006) and Kaplan and Norton (2004a, 2004b, 2004c, 2004d, 2004e, 2008) suggest several foundations that can assist improvements through a more rounded examination of an organisation including those areas described as intangible assets. The characteristics extracted from the review are set out in Appendix J citing the more detailed description and the reporting author with a summary presented in Table J-1.

Table 6-5 Supplementary Components identified within the literature from New Domains

IX Additional Factors from the New Domain writers on alignment
25. Long term view – constancy of purpose, long term relationship with suppliers 26. Customers – attitude to them most important, configure resources in customer-focused way, focus on value, customer perspective 27. Motivation – intrinsic and at all levels 28. Measurability - against purpose, performance expectations 29. Change process supports emergent approach 30. Interrelationship of culture, systems, components, organisation, stakeholders, financial, intangible assets and vision 31. Continual improvement – reduce variation, improve quality, reduce delays and defects, reduce costs, focus on financial perspective 32. Understand cause and effect 33. Training and knowledge- vigorous program of training education and self improvement, capacity and capability, human resource perspective 34. Adaptability not static alignment, organisation is capable of dealing with change 35. Leadership – helping, integrate decisions into work, act on system, improve quality, employee driven change 36. Identify and design key processes – to support vision, demand, value and flow 37. Communication – purpose, two way, reduce fear 38. Outside in perspective

Unlike the more theoretical models reviewed earlier the O'Brien test on factors contained in Table J-1 does register a more positive outcome in that the evidence base and use has far more depth ranging to Japan's economic rise after the Second World War allied to writings by Taiichi Ohno's TPS (1988) and Deming (1986) through to UK's public sector use of

demand management (Seddon, 2005). However, within the detail it becomes clear that few cover the whole aspect of alignment but feature specific interactions which, although significant, do not traverse the wide landscape of ICT and business alignment. The exception is perhaps Deming (1986, Deming, 1993) who does include a more embracing element to his writings but more as guiding principles.

6.2.2 Area Two: Methods and Methodologies More Commonly Available to the Practitioner

In chapter two the discussion concluded that structured alignment methodologies have not been utilised in practice within NHS Health services in Wales and this formed the basis for consideration, discussed in chapter three, over the approaches and methodologies represented within the literature and in practice. It firstly considered the available methodologies which were: ALIGN (Papp, 1999), an mnemonic of steps underpinning a methodology to achieve alignment; alignment perspective, a practical framework for managers in general, likely to be used by technology managers, to help them to identify the current level of alignment with the business and also to control future alignment (Avison et al., 2004); Technology road-mapping (Phaal et al., 2004, 2006) and its variant of IT alignment planning; blueprints as outlined in the Office of Government Commerce document Managing Successful Programmes (MSP); and Programme and Project Management. This was followed by consideration which was a representation of the critical success factors from the original Luftman (2006) publication supplemented by more recent survey data from the SIM surveys (Luftman and Kempaiah, 2008). The fifth alternative centred around performance management frameworks predominantly those presented by Kaplan and Norton (2004) and finally, information systems development methodologies reviewed by Avison and Fitzgerald (2003).

The theory and underlying foundations from system and process improvement domains were outlined in the previous section and were assimilated into the components in Table 6-6.

However, in addition, all of these methods have a place in the evidence base for their use and utility. Those specific aspects which have been included were: Lean Thinking (Womack et al., 1990) as a technique to improve flow and quality in the system with customers as part of the flow, improves empowerment and motivation; BPR (Hammer and Champy, 1993) for rethinking and redesigning business processes to obtain dramatic and sustaining improvements in quality, cost, lead-times, outcomes, flexibility and innovation; TOC (Goldratt and Cox, 2004) improvements in flow through constraint identification and links to improving the system are useful; and Six Sigma (Leach, 2005) an improvement technique which is limited to understanding the fluctuation of a process using statistical fluctuation measurement techniques thereby being able to improve overall performance although many have their roots within Deming's SPK. These have been extended into ST which assumes that the system to be identified with a single unifying purpose which must absorb variety and be cognisant of demand from stakeholders/customers and reported on by Seddon (2005) and Zokaei et al. (2010). Hence these system and process improvements have contributed to both theoretical and practical approaches.

6.2.3 Area Three: Case Study Findings

As described previously in chapter four the case study is based on the solution AuditBase (developed by Auditdata). This is a PMS used within Audiology, implemented into Audiology departments and hearing aid clinics across Denmark, Great Britain, Norway and Sweden. A synopsis of the interviews below provides the context for this analysis. A set of geographically dispersed services in North Wales did not hamper the development of the solution at a hospital department level nor did it constrain the roll out by being too locally specific. Significant improvements came from the development which was quickly replicated elsewhere in North Wales and the whole service provision experienced a step change. More crucially it was evident that benefits from using the system was experienced by many

different stakeholders with improvements emerging at many levels in the process and work flow. It proved to be a robust and stable solution which underpinned the service and delivered operational, planning and performance information over a long period of time where the service saw many changes in requirements. A motivated workforce, a mix of professionals, with a wide range of experience and skills were available to work with the supplier, themselves keen for success, led by a politically and professionally well connected consultant audiologist who: had a clear vision of the business strategy; knew what was required to deliver this into a service environment; and was comfortable with pushing the boundaries of the possible.

A long term relationship commenced and has continued throughout the life of the product developed initially in an environment not hampered by tight governance and resource constraints. The development came at a time of appliance and technological change within the audiology world which required a significant change in the way of working. It coincided with the incidence of desktop and server type technology being deployed. It was designed, delivered and deployed in close proximity to the service with firm leadership rather than remote governance committees who would have had to rely on reports and prioritisation criteria. The absence of an IT strategy did not hinder the development of a departmental approach. At that time the implications of this non-integrated approach were not visible. Being an early adopter of technology particularly in a design and subsequently in a test environment brought about a competence which turned visions into reality. It was designed without onerous governance and was not stifled as a result of local competition for resources. At the time of the development it was still possible to bring personal interests and experience into the working environment. This could introduce risk as software was more open to manipulation rather through accident than malevolence. Minimal training was available and it was not surprising when the departmental solutions joined the local infrastructure that their

ability to resolve day-to-day problems became restricted under the domain of the IT professional.

6.2.4 Summary of Analysis Areas

This section has introduced the extant literature reviewed from the area; the available models and methodologies; and the case study in preparation for the three phases of comparative analysis in the following section.

6.3 Comparison and Analysis

6.3.1 Comparison One: Applicability – Evidence from the Literature is supported within the Methods and Methodologies

As summarised the more academic frameworks focus on the components to be considered to improve alignment whilst the more practical methods start with the vision and the benefits to the business of any transformation through the use of technology. The analysis was undertaken in two stages, firstly, a consideration of each model and methodology against the criteria outlined by O'Brien (1995) to ascertain the level of knowledge contained and, secondly, a comparison of the literature components with the methods and methodologies. The former identified whether any recognised knowledge existed within the model or methodology and the latter determined whether any model was sufficiently developed or robust to contain those items which were identified by the literature review as being key aspects for business/ICT alignment. The initial review centred around conceptual models where Appendix K highlighted that none of the models provided clear fundamental or substantial knowledge, had limited well proven knowledge with values more as a frame of reference. In addition, their ability to aid decision making varied with no one approach being a stand out. Limited evidence existed that they were used in practice and limited insights were derived to support practical benefit. The next review undertaken was around described methods and methodologies drawn from chapter three which are outlined in Appendix L

(Tables L-1, L-2, L-3). The ALIGN and alignment perspective do not provide sufficient evidence that they are regularly used to support practice with the former model requiring the intervention of other alignment tools to support its five step approach. The alignment perspective takes the form of a domain analysis which is structured to provide an opportunity to change the IT strategic direction through the re-allocation of project resources. Its limitations are around the absence of a process in order to undertake the detailed analysis.

A second group, which are primarily improvement techniques, have more credibility in the field and are Lean Thinking (Womack et al., 1990), and Theory of Constraints (Goldratt and Cox, 2004) which all have practical use in predominantly manufacturing environments rather than the public sector. Their foci of attention are around process and flow rather than a wider consideration of business and ICT alignment but do contribute insights which are of practical benefit. All of these have a link to the work of Deming (1986, 1993) and an extension of Lean Thinking is found within ST. Although some work around ST has been reported, in practice, the evidence base in the public sector is small and in some cases disputed (Radnor and Walley, 2006, Seddon and O'Donovan, 2010a). The potential knowledge distilled is around the way that ST focuses on the interrelationship between the various parts of the organisation in order to achieve a single unifying purpose. Although it is possible that an analysis may touch upon the ICT and business aspects it is only from a demand perspective and can in some cases identify that less ICT is required, being a more radical challenge to the historic alignment perspective. A final grouping, MSP, PJM, BSC, Technology Road-mapping and ISDM/Agile all have considerable support and use within practice and in first two cases have a professional qualification and association regulating their development. PJM is slightly more limited in an alignment sense in that it is designed to be a temporary organisation set up to deliver the outcomes within an agreed business or investment case. Its use predominantly is in support to a wider plan of activities usually defined within a

programme sometimes, but not always, under a MSP approach. The MSP, which has wide support, can be used in a number of environments being a concept based around transformational change of organisations. This delivers a decision making environment by drawing out the current and future state of an organisation across a number of segments which includes technology and by default examines what would be required to deliver the transformed organisation. One of its components is the completion of a blueprint which aids the analysis of the segments in a structured narrative and graphical manner. The graphical element is similar to Technology Road-mapping which is more of a technology planning tool. This does not provide any inherent decision-making elements, more of a communication medium, nor consider wider 'non-technology' aspects of the business although variants do consider complex conceptual and human interactions (Phaal et al., 2004). ISDM's are multiple in number and variants with the effect that they become open to local interpretation. As a result evidence added to the knowledge base has been restricted and difficult to categorise although references to their value has been quoted as important for beginners to the programming environment and as a control for managers. This has not been embraced by experienced programmers unless part of an assurance against project failure. CSF's rely on previous evidence in order to guide the future activities of an organisation although what may be successful within alignment for one organisation cannot always translate into another even similar one, suggesting that they are indications rather than certainties. The final model in the review is the balanced scorecard which initially set out to be a performance measurement framework and developed into a generic framework to translate strategies to objectives. It is particularly strong around the examination of intangible assets which includes a number of the dynamics previously identified around technology, human resources and organisational cultures. Evidence quoted suggests that performance using a formal system such as BSC out perform their peers. This primary review suggested that, from a decision making viewpoint

when considering alignment aspects, three approaches which can contribute to alignment and are used in practice are System Thinking (a unifying whole system approach), Managing Successful Programmes (a more bottom up approach) and Balanced Scorecards (top down approach).

The second analysis addressed the comparison of the literature components to the Methods and Methodologies with the objective of ascertaining which models encompassed those espoused elements as part of their framework. The literature components compiled earlier in Area One (Tables 6-1 to 6-5) were combined in one tabular format Appendix M (Tables M-1, M-2) with their components compared in turn against the selected Methods and Methodologies using a simple narrative summated at each level with a graphical text and colour code being: Yes (Green), Partial (Orange), Not Clear (Pink) and No (Dark Red). A quick visual review reveals that the ALIGN, Theory of Constraints, and Lean Thinking don't address a significant number of components: business strategy; IT strategy; and IT infrastructure and processes. There are limitations around integration design with partial compliance around aspects highlighted from new domains (Table 6-5) and wider factors drawn from other writers on alignment (Table 6-4). Although stronger on process related issues they all fail to significantly address the human factors of wider alignment. CSF's depend upon an evidence base of similar activities to provide an indication only of the likely effect of certain components of an alignment venture. They are based more upon association principles rather than the more rigorously defined causation and for this reason they have partial application in certain activities and are best used alongside other methods like BSC where associations have already been quantified. ST challenges the status quo which takes the view that most systems and processes are designed around a command and control structure approach and therefore fails to address what the customer really wants from the infrastructure and service within the Business and IT quadrants. It also sits well when

considering the more dynamic environment identified by writers and the new domains. Although seeking interrelationships across the organisation to achieve a unifying purpose it clearly requires a cultural shift across the organisation to enable and empower staff to act upon the system and not top down management missives. More conventional in their approach are alignment perspective (Avison et al., 2004) and Technology Road-mapping (Phaal et al., 2004, Phaal et al., 2006). They provide a partial map to the literature components both being weaker on human factors and customer influences whilst showing limited consideration of IT governance. Technology road-mapping, inherent in its technique, is far more robust in considering integration aspects but is built on mechanistic principles which stifles it adaptability. ISDM by contrast builds upon strong integration aspects and brings agile principles to address this adaptability. Technology road-mapping strengths are around being time based with an ability to track disruptive technologies (external viewpoints) and has an increasing evidence base within the literature (Phaal et al., 2004, 2006). It remains weaker in its treatment of human interactions and the scope remains broad although this assists with communication of strategy. Although clearer to stakeholders of the value over their process attributes ISDM is also weaker on human factors and consistently maintains a bias towards the impact on the ICT development factors being considered. MSP and BSC both compare well with the strategy and infrastructure quadrants having similar aspects within their respective methodologies (Table 6- 6). The differentials emerge in the detail around linkages to processes, operations and strategy where the BSC remains more flexible particularly around cause and effect impacts and direct links to customer perspectives. It also out performs in the area of measurement where a plethora of measures can be derived to assure the organisation that the strategy is being achieved over time as well as considering the cultural, training and softer organisational issues like leadership which are key to success.

Table 6-6 Comparison of Approaches within MSP, BSC and ST.

Balanced Scorecard [4 Quadrant analysis]	Managing Successful Programmes [POTI analysis]	System Thinking
Vision	Vision	
Financial Perspective	Assessment via Business Cases	Failure Demand
Customer Perspective		Demand Measurement
Process Perspective	**P**rocesses	Review of processes, Design of system, reduce variation
Learning and Growth Perspective Organisational Capital Information Capital Human Capital	**O**rganisation Capital **T**echnology **I**nformation	Action Learning Empowered Organisation Management Ethic Intrinsic Motivation Partnering
	Current and Future State Analysis	Current and future process
Cause and effect analysis		Failure Demand analysis
Measurement Implicit		Measure key demand Avoid Targets

This second analysis demonstrated that three potential methodologies had the potential to respond to those items identified within the comparison to the objectives of enquiry and these can be enhanced with aspects identified within: technology road-mapping around external viewpoints and a time based graphical presentation; and the agile aspects identified within ISDM can significantly enhance development processes and improve outcomes in a more timely manner.

6.3.2 Summary of Comparison One Analysis

The outcome demonstrated that:

- the available methods varied in their ability to match up to the requirements criteria to produce an ascendant alignment model
- whilst some were limited from an alignment perspective a few encompassed what can be described as knowledge and would aid decision making
- three methodologies (BSC, MSP, ST) had frameworks which could encompass and address the majority of literature components
- road-mapping added components which could visually enhance the approaches and introduce a time based perspective
- iterative approaches, as demonstrated within agile approaches, would also bring an improved dimension to any future model.

Although some gaps existed it was noted that it was possible to link the requirements to at least one approach within the model portfolio. This would suggest that in a practical sense an element of combination of elements from these models and methodologies would provide a more comprehensive approach to business and ICT alignment.

It was, however, important to ascertain whether any of these components expressed through the whole or part of the models and methodologies were in fact visible within the case study observations and these were examined and reported within the next section.

6.3.3 Comparison Two: Usage – Evidence of Methods and Methodologies being used is supported by Case Study Findings

The next piece of the analysis considered whether the model and methodologies initially had any resonance within the case study findings at a visible level (explicit) or invisible (implicit) to elicit any evidence whether any model or methodology if applied could improve alignment. There was no evidence in the case study that participants used any explicit model

or methodology to plan or organise the work towards achieving the vision which had been articulated by the consultant audiologist yet there was a clear link between the service change and the underlying benefits of the information system within the initiative.

6.3.3.1 Case Study Analysis

Initially alignment of technology with the business requirements were not formalised into a strategy at a local or national level with the main driver being a professional view of what was required. Technology was also considered solely by an individual who used local knowledge, his professional expertise, technical electronics training to build an implementation around the available capacity and capability. At no stage were plans from a drawing board (Ciborra, 1997) and diagrammatic models such as IT Roadmaps or blueprints or formal written requirements (statement of user requirements - SOURS) created or in fact requested by the organisation. Other key differences with more modern best practice approaches was the absence of a formal project team and manager; formal checklists around readiness; and formal recording of issues or risks. Limited preparation was undertaken before implementation, issues being resolved as they occurred, leading to a flexible response to deployment. The downside risk to potential customers was small and lack of best practice examples or models did little to reduce moving forward and bringing success. The only area where best practice impacted was around procurement but with limited experience in its use of such guidance led to partial use. Overall, this suggested that due to its size and scope of the solution any response to the methodologies available to the department were somewhat muted in that the interactions to achieve alignment were self-evident and success factors known. This may signify a relationship to more use of methods and methodologies when the number of unknowns or interdependencies is significant in number, size and complexity.

6.3.3.2 Practice Based Models

This case study analysis did not disprove the value of such models and the research approach did use one of the elaborations to structure the components and present them in the findings. Although structured informally the departmental professionals view did consider a number of aspects contained within some methodologies: technology (P2), processes (P2), information (P5), stakeholders (P3), HR (P2). These were all aspects which were contained within the alignment perspective, BSC and MSP and there was a consistent and commonality of areas considered, albeit informally, which does not invalidate the use of models but suggests the implicit lighter touch was based on experience and knowledge. It is important to highlight that although these requirements were not written down in a formal sense they did still exist and were commonly understood within the team and applied to achieve the future aspirations (P3). They were based around the vision jointly constructed between the CAS from a departmental efficiency perspective (P2) and the supplier based on an academic paper outlining the benefits of paperless working (P1). This approach to vision realisation has commonality and linkages shown within areas such as stakeholder perspectives found within the BSC and the future state as part of a MSP Blueprint. Further aspects identified within the case study, similar to a number of the methodologies (highlighted above), were the consideration of technology, information and a new way of working without paper (processes). The key aspect here was the iterative approach of what was a key process to deliver success of the solution. Although the approach was more of an agile methodology at that time it was not recognised as such, nevertheless, it does concur with the IAF approach where the design phases are linked through the visions, business and IT systems to ensure an integrated solution. References were made by P1 to moving over time from an ad hoc approach to developing, configuring and maintaining solutions to one which maintained a quality assured approach within an agile approach. The technology was also considered in

detail by the CAS who identified the appropriate 'engine' that a solution should be based upon with a structured query language (SQL) database to ensure a robust infrastructure for the application. This was another aspect where a more structured approach as typified by BSC and MSP would have identified important aspects of integration with wider architecture and corporate systems. It must be recognised in hindsight that such infrastructure was not well defined or available at that period in the solutions life cycle. The information requirements were less well defined at the start of the design as, in true information principles, the outputs would be a by-product of the operational processes which was the case. This was perhaps one area where some divergence from academic models and more rigid ISDM (e.g. structured systems analysis and design method (SSADM)) occurred in that the deeper consideration of wide information requirements was subservient initially to that required within the process workflow. Further transitions and transformations under structured ISDM would have identified additional key processes which were required as part of project cycles and would have highlighted testing and implementation aspects for consideration. Projects and programmes identify states of readiness within their structure and have become key transitional activities in more current environments. The case study was moving from predominantly paper based approaches to enabled electronic pathways, so comparison to current methods may be limited, but the aspects of readiness are now key project activities. Within the methodologies these readiness factors are best highlighted in the balanced scorecard which considers the wider readiness aspects within its learning and growth quadrant by identifying states of organisational, human and information capital. Embracing the solution along with the modernisation agenda by the WG of the time did demonstrate the importance of convergence of activities around the appliance, suppliers, solution, environment, training and knowledge which again suggests that a more structured approach was successful on a wider platform (again MSP traits) to bring the benefits into the

service for patients. Subsequent roll outs across North Wales and beyond did employ an element for project methodology as part of the structured approach. The impact of national audiology strategy began to leverage the patient benefits brought about by the issue and support of digital hearing aids. In other strategies, this may have caused difficulties with the appliance technology outpacing any development of IS but in Wales this was not the case. The adoption of a more standardised approach was as a direct impact of the strategic initiative although the underlying computer IS was almost not available due to the lag between the development of product and the delay before the initiative. In a structured approach this would have been identified much earlier as a key dependency and activity. Finally, the approach did generate significant financial benefits which were endorsed by the management teams at that time which demonstrated that a financial perspective of the benefits through reduced stocks, improved throughputs and administrative efficiencies were key outputs of the implementation success. In the absence of business cases (P2) this was less visible within the case study than in more current methodologies but was still present as a factor. Reviewing this detailed examination confirms that a number of areas which subsequently came to light as shortfalls or deficiencies could have been highlighted and addressed earlier in the developments had a more structured approach been used (e.g. where gaps appeared around integration with other systems and flows of information). This suggests that some structured approach possibly through a model or methodology to test understanding, promote gaps or areas of concern would have led to decisions and brought further value in bringing alignment.

6.3.3.3 System Approaches and Process Improvement

The absence of any conscious use of an approach were repeated when considering what can be described as the systems or process improvement methods such as lean, theory of constraints or systems thinking when discussed with participants. However the interviews did

elicit some characteristics that can be construed as related to aspects found within the new domains of knowledge. The findings here concluded that no correlation existed between the department's actions and that of considering any system constraints (TOC) or the use of statistical analysis of variation (six sigma). An emphasis on flow of work through the department initially gave a possible insight into the use of lean methods but on closer comparison the 'value added' steps in the process were probably no more than normal process mapping considerations with value to the customer considerations (patient) at each step not being a factor in the design. It did, by future proof designing, simplify the process from a paper based one, reduce variation (a Deming aspect) by providing one way to work through the system, and has seen improved services over time developed in small iterations rather than deep analytical studies. However, although early gains in performance were made at the time of transition from paper to digital (a more standard way of working – Jidoka). There seems to have been minimal appetite to bring further sustainable change through on-going lean initiatives. With ST having its roots within Deming's writings it was not surprising to find some similar observations as indicated earlier in chapter three (Table 3-4). The strongest ST component was the attitude to supplier where both the department and the supplier have derived significant benefit from a spirit of cooperation rather than contractual relationships. Slightly less strong was the design centred around the flow of processes for the future way of working and was supported by iterative development closely involving prospective users. Allied to this was the software which allowed decision making and approvals to be made by the clinician thereby improving the processing time. The CAS took his vision and ensured a solution was discovered, designed and deployed for use in other departments across the country which, from a methodology perspective, was a bottom up approach. This was also at the time he was displaying leadership within his department and the solution. Having thought through the wider system boundary it suggests that there was a bias towards a system

thinking approach in the early periods of development. However later, as governmental guarantees over service levels became more prominent, the design and improvements became less about what actually mattered to the customer, or improved workflow for the immediate users, and more what was 'targeted' by national government.

Although reference was made to the importance of process the introduction of digital hearing aids at the time of the solution deployment already provided the lever to bring innovation into the new way of working. At the time the approach was considered to be, in Hammer and Champy's (1993) terms 'radical' and also saw 'strong top down leadership' (within the department), 'information technology enablement', and 'employees empowerment' (Kettinger et al., 1997). Therefore, although it assumed similar characteristics to those described by Hammer and Champy (1993) this was not as a result of the methodology being applied to the situation. The findings suggest that some of the process improvement techniques, particularly the ones rooted in Deming's principles, although not consciously used had resonance within the case study findings which adds validity to the use of tools like ST and a focus around the process enabled by IT. It also highlighted that small innovative approaches become overtaken by national initiatives (top down approaches) that can reduce the effectiveness and purpose of the original solution. This may suggest that boundaries will impact upon the scope within which ST can be effective. Further research will be required in the future to see if this direction of travel continues towards a more command and control approach perhaps driven as part of a nationally integrated strategy where there exists a danger that such bespoke software is likely to be a low priority within the wider informatics environment.

6.3.4 Summary of Comparison Two Analysis

Following the interviews, it was clear that

- no conscious use of any method, methodology or best practice approach was used within the development and subsequent deployment of the solution
- the actions and thought processes highlighted by participants do provide some evidence to support the view that a number of aspects found within models and methodologies were present within the case study
- use of the approach found in some of the models and methodologies would serve to be useful to structure responses, make decisions and highlight their use as a checklist of areas and factors
- when considering process improvement techniques some characteristics and use of some of the principles would have further improved the longer term responses to design and alignment
- later stages of implementations made mention of some project management methodology where a national perspective was added to the strategy implementation but minimal evidence of the detailed approach was available

It was decided to return to the methods and methodologies after the next section which would validate the literature views through the review of the case study findings.

6.3.5 Comparison Three: Validation – Evidence from the Literature is supported by Case Study Findings

The summary of literature aspects were identified earlier and the purpose of this next review is to consider whether the case study findings support other writers. The initial analysis was contained within chapter three. In Chapter five, RO2 used the structure elaborated by Luftman (1996) and identified those aspects which were present in the participants interviews. This elicited some interesting outcomes, which challenges the alignment model structure, and the analysis starts with the business strategy quadrant.

6.3.5.1 Literature on Conceptual Models evidenced in the case study

An elaboration of the SAM components within a public sector context questions and implies areas for consideration in a future model. The underlying premise of a clear customer, supplier and shareholder are not applicable and concepts around stakeholder are more relevant. This was demonstrated within the case study with multiple relationships all having significant interactions: patient and department; department and local management; department and WG; department individuals and scientific advisory group; department and supplier(s). This translates into different forms of contractual and pecuniary flows where the citizen (patient) receives a service, in this case an appliance, provided by a local department but paid for through the WG from taxes raised by national government. A competitive environment is replaced by the need to identify and justify benefits to the identified stakeholders which may be financial, efficiency, service levels or politically committed achievements. The citizen has a central place in this service which requires re-examination of not only the way in which the service is received but the way in which social changes are shaping the requirements for the future e.g. use of mobile devices for communication. The detailed influences that this brings are therefore more complex than the simple customer, shareholder and business model and is not reviewed within the review of literature being beyond the scope of the study. Chapter two highlighted the impact that political directions can make to future services (Welsh Government, 2011) by highlighting digital by default and the financial imperatives to provide enhanced and more cost-effective and accessible public services for all citizens, businesses and communities. These along with changing behaviours of society and indeed citizens themselves brings cause for any future models to consider wider external factors not immediately present within any of the conceptual models.

Allied to the relationships are regulations which play a significant and more prominent role in the provision of health services where the competencies to be identified are more of a

minimum threshold than competitive advantage and ability to provide a service. This also suggests that the examination should centre more on capability and capacity whether it is through the individual department or through a contracted supplier. This is based on the premise that the health sector now has a mixed economy of private and public provision although this is more limited within Wales where private sector outsourcing is restricted. Future alignment research should consider these aspects rather than just the competitive advantage. In addition, the level of oversight into many areas of service and research has heightened over the last 10 years as a result of experiences and exposure to failings resulting in the creation of committees for ethics, green approaches, equality, safety and environment. Such supervision, typically undertaken from a distance, has the effect of constraining potential opportunities despite where evidence of competence exists. The ability to form partnerships with suppliers is now within a framework of European legislation and the creation of informal partnerships has also become constrained, unlike the case study, which promotes a clearer understanding on the alignment potential of prospective partners by producing requirements or specifications to be met by suppliers within the contractual frameworks. The complex stakeholder influences, referred to previously, require a different view of governance arrangements. The case study demonstrated that a light governance regime allowed innovation and more effective alignment. More recent events suggest that risk averse stakeholders impose a greater scrutiny over identified potential opportunities at an early stage as well as through prioritisation of resources. The investment criteria used are more about benefit identification and justification thereof rather than achievement of a vision. This is particularly prevalent in the resource constrained environment. Therefore the case study environment was unique at that time in terms of the way that the local form of governance was achieved.

Finally, in this area consideration should be made to focus this initial quadrant (I) of a Service Strategy rather than a Business Strategy. As indicated earlier Thomas (1978) highlighted the concerns over the predominant mental image of the workings within a business being one of a 'product-based' approach which leads to a product-orientated language thereby constraining the communications when attempting to manage a service business. In addition, the author outlines, which is relevant to the public sector, that the service is often produced and delivered by a single group of people which leans towards more of a decentralization of the service production process at a local level, where decisions are made. Moreover, Skaggs and Huffman (2003) draw attention to the type of strategy adopted by the service business can affect the uncertainty of their dealing with customers. Therefore, this quadrant needs to consider that in providing a service due consideration must be made as to the type of strategy adopted, due to the level of uncertainty that this brings in customer interactions, which will influence the delivery of what information is required to these decision points and will therefore be key factors in the alignment requirements. Finally, Quinn et al. (1989) suggest intelligent out-sourcing or coalitions as a mechanism to deliver services which have a tendency to be treated as indirect and overhead expenses rather than services, citing the value of smaller, state of the art product and service suppliers to shorten product-development cycles.

Table 6-7 Components of Alignment – Service Strategy

I. SERVICE STRATEGY
1. Service Scope- includes the services provided to public (citizen), the geographical service area, service levels, national and local performance targets. It includes a review of social trends in the use of technology and its effect upon service delivery. 2. Distinctive Competencies and Constraints – the delivery focus for the capacity and capability that provide the organisation with a competence or constraint to deliver services i.e. out-sourcing, coalitions, internalisation. This includes customer interactions, service provision groupings and locations, outcomes of

citizen reviews, and service responses to new initiatives.

3. Service Governance – how the service set the relationship between stakeholders including: public (citizen), staff, workforce representatives, management, officer and non officers, and oversight committees. Also includes how the organisation and these stakeholders are affected by government and European regulations which also influence relationships with external partners.

The next quadrant for review covers what Henderson and Venkatraman (1990) describe as the organisational infrastructure and processes. The case study highlighted that political changes over time influence the way the service is structured having moved from separate commissioning arrangements to a single organisation, independently managed organisations (Trusts) to Local LHB's, discrete service areas to wider integrated public service approaches (Welsh Assembly Government, 2004). This has a profound effect upon the organisational infrastructure and therefore its processes as flows of information and responsibilities are changed with each transition. This also has a rate limiting step, upon the consolidation of processes with the enabling technology, where a lag effect of investment makes the implementation of new solutions, or consolidation of existing as in the case study, maintain a slower pace than the detail and velocity of changes to the service provision. The consequences of merging or demerging organisations on individual systems or identifying limitations around the technology are not considered and whilst a number of private sector mergers have failed because the multiple back end solutions of involved parties cannot be reconciled, the case study set out some of the challenges to the public sector where non consolidation is not an option. This critical success factor does not feature in political plans and announcements. In a local sense, the overall management structure can influence the business ethic and direction (i.e. clinically led) or can vary depending upon the service provision required for the citizen. The case study showed an empowered workforce capable of identifying requirements and involving them within the design, considerations over

resource management and ultimately the service provision. They worked across historic boundaries within the hospital and in the community. On a wider basis other professionals have far less autonomy e.g. at ward level and fit within a hierarchical structure both organisationally and professionally. These multiple perspectives need to be considered during alignment. It is concluded that this component be renamed Organisational (Administrative) Structure and Responsibilities to accommodate this purpose.

The case study provided clear evidence in the area of processes and their importance in alignment. They demonstrated the importance of managing the complex workflows underpinning the patient pathway across appointments, ordering, generating resource and performance data for management. It was also apparent was the step change in process improvement which had a significant benefit to different stakeholders. In the context of health some of these benefits to assist alignment were: access to patient data for clinicians at the appropriate time and place in the pathway; equity of treatment access where demand exceeds capacity; more effective capacity planning and scheduling with reduced hand offs within the process giving patients improved choice and in a more timely manner; and enhanced quality of communications for patients. Almost all of these transformed the current manner of working which clinicians readily embraced, taking out non value adding steps. Underpinning this change was a standardisation of approach which because it was an improved way of working was normalised without opposition. A difference with the Luftman elaboration is the focus of identifying who in the processes will derive benefit. In the case study the immediate beneficiaries were patients and staff as a direct consequence of improving the flows and access to information although this was not evidenced through any pre-post survey or analysis. This suggests that some measurement technique needs to be part of any future alignment model and concurs with other authors (Peak et al., 2005). The other aspect is around where the benefit emerges within the organisation with the case study

demonstrating that a balance is required between: who benefits; the operational process; and derived performance information. The information principle that management information should be a by-product of the operational process still remains valid. The study also highlighted that indirect benefits may occur as a consequence of any improvements and such factors require identification. There is a link between the boundaries discussed in the previous paragraphs and the following one around processes in that service organisations can play a more active role in determining the amount of client interactions that is addressed highlighted by Skaggs and Huffman (2003). During the latter observation stage is was clear that further value had been added to the processes by extending the role of patients in the processes particularly in the areas of checking-in utilising simple kiosks. This concurred with Skaggs and Huffman who highlighted in earlier work how customer coproduction resulting in standardising customer inputs and reducing potential variance in customer demands.

The next variation within the case study to Luftman is around the range of people involved and the differing skills or capability with which they added value. In the findings it became clear that whether planned or otherwise a good match of requirements and competence assisted the outcome. This was reinforced by a diverse range of educational levels and life skill experiences. The Luftman quadrants do include these aspects around HR whilst how the ability to hire and remove staff affects alignment is not clear with the only aspect present in the case study being the short term hiring for more menial repetitive tasks to be undertaken. The working atmosphere was a key driver of the momentum and success within the development and commenced well before the inception of the vision. Another aspect is the skill requirement around the patient- service interactions described as client-firm by Skaggs and Huffman (2003). They suggested that where information flows became more uncertain that more skilled employees are needed to interpret information from customers and disseminate it properly through the process. Evidence from other sectors outlining the

responses to this service interaction is not always encouraging (King, 2007). There was little evidence to suggest that there was any reduction in the skill levels following the introduction of the Audiology solution but this may require further research. Perhaps the key omission, although it could be contained within culture, was the clear importance of leadership which transcends the boundaries of the work efforts bringing support, encouragement, taking well considered risks and bringing a 'can do' attitude. This is perhaps the key omission in this section of the quadrant.

Table 6-8 Components of Alignment – Organisational Infrastructure And Processes

II. ORGANISATIONAL INFRASTRUCTURE AND PROCESSES
4. Organisational (Administrative) Structure and Responsibilities - includes transition state of organisations, boundary of service provision, professional or organisational autonomy, structure and responsibility of management tiers. 5. Processes – how they clinically flow, value added opportunities and workflow improvements. Identify: customer co-production opportunities, core processes; a balanced approach to benefits are achieved avoiding bias towards to operations or performance management; direct and indirect benefits would reveal themselves; agreed national or local processes are employed. 6. Skills – Leadership impact (drive, direction, support), range of educational and skills (inc life skills) matched to requirements based on customer interactions, culture – will to succeed.

The overarching governance within the public sector, enforced through oversight committees and auditors, regularly highlight the importance of having a clear IT Strategy yet in the context of Health, particularly with the diverse services which it offers, such an approach is almost an impossible challenge in relation to systems without investment in all encompassing solutions. The SIM annual survey (Luftman and Derksen, 2012) quoted in chapter 2.9 highlighted the rise in ERP systems which: provide a vehicle for reducing business expenses as companies leverage IT to reengineer business processes; and help business partners reduce costs and improve productivity. They also outline the importance of collaborative and

workflow tools. Such approaches are extremely expensive when related to NHS services (Cambridge University Hospitals, 2013) and in a resource constrained environment difficult to justify. Moreover, set against the departmental level requirements and the continuing debate over the bespoke nature that this brings to the requirements schedule, the resulting dichotomy highlights the importance of having a very clear inclusive strategy. The case study focussed upon the bespoke end of the solution delivery (produce applications which achieved paperless environment, combined clinical workflows and patient data, rationalise administration processes) and by its nature supported only an internal perspective of workflows and integration. With no IT strategy at the time of the work it would appear that its absence had little downside effect, a fact confirmed in the findings, but hides the longer term affects as the infrastructure and strategy rose into ascendance over time. Such development of the strategy was done in a top down manner and therefore disregarded any local initiatives. This brings a required change to the components within this quadrant in that, rather than solely focus on the important information applications and technologies, recognition of existing local bespoke solutions should be factored into the wider strategy. This will widen the requirements in the strategy so that the scope will identify that solutions must be richer than at first concluded. The direction of travel in medical devices, similar to those identified in the case study over hearing measurements, which will collect their own set of datum, provide automation of processes, support intelligent workflows, all suggest that future strategies will require more sophisticated integration.

The case study findings focused on those embedded capabilities which were evident to the participants (expertise of the development supplier, the knowledge of technology use in a business environment, stability of the product when developed, the ability of the solution to make information available at different process levels as well as stakeholders) thereby achieving the vision set out by the CAS. This suggests that when considering the technology

competence to be deployed a wider analysis is required to consider differing viewpoints of stakeholders to compare with what is currently strong and available i.e. distinguishable. Without such reconnaissance it will not be possible to assess where gaps have been identified, their significance and what approaches will be required. The quadrant was derived from experience at a time when it was just the earlier days of computing in health environments and therefore a more introspective approach to technology. This needs reviewing when cloud computing, integrated data/voice, personal mobile devices et al. are all 'competing' in this environment with the boundaries of any review needing to accommodate a level of competence in order to be part of a wider social interaction rather than just focus upon its own capability. Such capability may be offered through a third party such as a supplier or a national solution provider which further expands the review beyond the internal boundaries. Evidence in the case study highlighted that the solution was extremely robust and fit for the purpose expected by the department. This is another aspect which requires reinforcement in a review in that the availability of functionality does not immediately translate into a competence or capability with latter day evidence being drawn from the constrained capabilities following slow development and delivery within the national programmes. The case study identified very limited governance oversight throughout its early initiation, supplier selection, design or development. With the focus within a small department it was not set against a competing list of priorities when considering investment nor set against a local or national strategy within which to adhere or at least converge towards. With no financial constraints at the time it was possible to plough the benefits and cash savings back into the departmental services resulting in a virtuous circle. All of this was done within a loose managerial relationship based more on track record, competence and earned trust. This is compared to more recent approaches where a tighter control to strategy convergence reinforced by tight oversight is used to support the governance requirements

which has the effect of stifling innovation or reducing the ability to make small steps of progress towards learning and success. The case study suggested that alignment of informatics solutions are best designed, delivered and deployed under limited governance in close proximity to the service requiring support rather than remote governance committees who have to rely on initial prioritisation criteria and regular reports on progress to track outcomes. This compares with a high risk management environment driven through with project techniques escalating through to HB risk registers which are regularly reviewed for progress and mitigation. The current environment uses these themes in a plethora of service boards which have replaced the informal groupings such as user groups. Another aspect which emerges from the case study is that around who is responsible for and who manages the overarching themes of ICT. In the case study, a loose arrangement was supported between the CAS and the overall management whilst more recent approaches can have ICT as part of a portfolio of responsibilities for executive directors. This can diminish the focus, dependent upon the level of empowerment and decision making capacity built into the overall HB e.g. ICT procurements over £250,000 must be signed off by the DOF and over £1m by the WG. All of these levels have supporting document requirements (business case) of increasing complexity. Inevitably where part of other competing service provisions the focus upon ICT will be reduced purely as part of being within an individual's span of control. Such implicit constraints through time and financial thresholds must be known and recognised within any review.

Table 6-9 Components of Alignment – IT Strategy

III. IT STRATEGY
7. Technology Scope – The big important applications and technologies but also the bespoke departmental including links to equipment and device derived information thereby identifying integration requirements across the

organisation.

8. Systematic Competencies – Those capabilities which are a pre-requisite in order to interact with stakeholders (including the public) as well as internal capabilities. This also focuses on what suppliers can offer. The analysis should consider not just the functionality but also its robustness and fit with purpose.
9. IT Governance - who manages (span of control), financial thresholds (documentation complexity), risk approach, committee structures and delegated authority, how project(s) are managed

The case study outlined how over time the local departmental solution closely coupled to the data from equipment was later integrated into the infrastructure. This is again at the opposite end of the continuum when applying the Luftman quadrant where the components focus upon the technology priorities, policies and other choices to allow applications, software, networks, hardware and data management to be integrated into a cohesive platform. Increasingly, departmental solutions based upon specialty specific requirements are driving a fragmentation away from a corporate style of 'one size fits all' approach to applications. On the other side of the infrastructure around networks, end user devices and data storage a more corporate approach is sustainable, in fact required, to underpin multiple applications across different disciplines other than clinical solutions i.e. corporate departmental systems like financials, procurement, human resources. This combination results in an increasingly complex set of links and messages being passed from departmental information islands requiring sophisticated interfaces or messaging fabrics to be put in place. This amendment to the Luftman component to architecture has obvious distinct parallels to the technology scope. In similar terms the case study had minimal reference to the need to differentiate between organisational (service) processes and those which were provided through technology. In addition, when changes to the software was considered a more informal approach to testing and deployment was undertaken but gradually over time improved to be more effective at a departmental level and within the supplier environment before release. Significantly, more IT

infrastructure processes are subject to formal release practices, many now Information Technology Infrastructure Library (ITIL) based, which has the end result of improved control. This must be reviewed and balanced by the need to submit, process, consider and prioritise requests through the previously mentioned service board environments. These need to be closely aligned to the organisational (service) processes which they support. From a quadrant perspective the approach used to control the environment is now a significant factor to consider. The skills aspect is very close to those found within the organisational quadrant in that a good match of requirements and competence are required to assist the outcome reinforced by a diverse range of educational levels and life skill experiences. The working atmosphere remains a key driver of the momentum and success and leadership linked to an understanding of service requirements of ICT are paramount.

Table 6-10 Components of Alignment – IT Infrastructure And Processes

IV. IT INFRASTRUCTURE AND PROCESSES
10. Architecture - The big important infrastructure approaches but also the bespoke departmental including links to equipment and device derived information thereby identifying integration requirements across the organisation. 11. Processes – The practices and techniques used to request, develop, maintain applications and the infrastructure. Closely linked to organisational processes. 12. Skills - Leadership impact (drive, direction, support), range of educational and skills (inc life skills) matched to requirements.

The GF (Maes et al., 2000) set out to emphasise that business and IT should be considered as independent variables in their own right to achieve alignment particularly when considering strategic and operational levels. In contrast to the concerns of Maes et al. (2000) the case study provided minimal evidence that the strategic level was pre-eminent and the CAS was

well aware of the complexities of cultural, political and financial aspects dealing with them on a regular basis to mitigate delays in progress. The importance of information and infrastructure as key factors for consideration was confirmed. The drivers for change whilst encompassing recognition of patients interactions were built around the process and information benefits through integration with the new technology which itself was an external driver in fact rather than perceived. The findings confirmed that patients were perhaps unaware of the changes and were spared any transition complexities with the move from widespread paper records to electronic documentation. The importance of core competencies was however more readily evident and highlighted in the case study findings.

Table 6-11 Components of Alignment – Generic Framework

V. Generic Framework
13. Information and Infrastructure 14. Customer Thinking – links internal processes to stakeholder perspective 15. Core Competencies – further emphasis.

The Cap Gemini model aimed to support the integrated architectural design of business and IT and its major dimensions were broadly covered work within the case study. As indicated earlier the design and development element was not followed in a structured manner with a greater emphasis on the deconstruction of processes and iterative development work. There was minimal evidence that particular design phases took place or technology blueprints to guide the design of specific viewpoints.

Table 6-12 Components of Alignment – Integrated Architecture Framework

VI. Integrated Architecture Framework

16. Integration of design between Business and IT – iterative process – takes into account vision, current architecture and design phases 17. Specific viewpoints – needs to consider special viewpoints e.g. security

The UF was created from the GF and IAF with the added reflection that alignment should be a continuous process of managing, designing the inter-relationships of the business – IT relationship. The case study was more consistent with this view in its life cycle output but the conscious approach to a framework such as the Unified Framework was not evident.

Table 6-13 Components of Alignment – Unified Framework

VII. Unified Framework
18. Process perspective of design – add strategic, structure and operations perspective

Key points from literature on Conceptual Models evidenced in the case study
Referencing the case study findings demonstrates that changes are required when considering analysis of alignment components. The first key area which is not clearly captured in the current set of conceptual models links back to the changes in the wider external environment which will in turn determine factors and responses to facets around stakeholder requirements. This was identified as a simple political, economic, social and technological analysis (PEST) which is a framework of macro-environmental factors used in the environmental scanning component of strategic management. In particular, this should identify some of the political directives being delivered within the prevailing economic conditions whilst recognising changes of attitude and behaviour in society particularly in regard to the type, availability and

use of technology. Given that the subject area is the public sector more attention needs to be given to identifying the wide range of stakeholder relationships to highlight what benefits accrue through the pursuit of a vision using alignment as an enabler. Thus reference to a service strategy is more appropriate than the previous business strategy and in a financially constrained environment the benefits, so clearly evident in the study, need to be clearly identified and assured in support of investment cases. No doubt influenced by publicised failings the services are highly regulated and, in a departure over time since the study, are subject to European legislation which limits the abilities to select strategic partners or informal working relationships. This is accompanied by a greater degree of oversight at multiple levels be it financial standing orders, national strategy constraints over approaches or UK and Wales political announcements. This has skewed the positive effects identified in the case study over innovation and therefore subsequent reviews need to also identify within the components how does innovation survive whilst considering the constraints and barriers to alignment. In turn the governance arrangements are no longer separated at a Health Board level and need to be considered collectively in regards to risk management, service developments although ICT is just one component of a diverse range of factors and products which needs to be considered leading to the dangerous situation that services are changed without reference to alignment challenges with technology. A second level is the tensions between local service delivery requirements and national ICT approaches focused at a high level across a number of public services. With the rapidly merging use of technologies in the service environment the case study highlighted the importance of key leaders having the confidence to deploy technology as well as having and displaying the service knowledge and experience. This close association questions the value of the assessments having any segregation between Organisation and IT skills. In addition, capacity of resources for alignment is now a key additional element in this component. In similar terms to skill

requirements the processes employed within an organisation are not only key to delivering benefits to stakeholders but are tightly coupled with the technology which makes the segregation between IT and service artificial. This was demonstrated in the earlier stages of the case study where opportunities were identified, developed, deployed and as a result no longer stood out as discrete elements but ultimately became part of the general infrastructure. This trend has continued and needs recognition in future alignment reviews. Implementing such changes requires leadership, a factor so readily evident in the study yet was not readily visible in the previous framework. This brings the factors around staff empowerment into sharp visibility with their ability to influence how things will be aligned.

6.3.5.2 Literature from other writers on alignment is evidenced in the case study

The next stage of the analysis was to consider factors to which other authors had drawn attention, presented in chapter two, by suggesting that they may require embedding within any conceptual model. These were discussed earlier in the chapter and were identified as characteristics to be achieved and are grouped into the following elements set out in the Appendix I (Table I-1).

Table 6-14 Components of Alignment – Additional Factors from the writers on alignment

VIII. Additional Factors from the writers on alignment
19. Adaptability - not static alignment, capable of dealing with changes 20. Constraints and opportunities – consider human, technological, managerial 21. Dynamic process 22. Evidence Base and practical approach to use 23. Linkage – between strategy and implementation 24. Measurability

6.3.5.3 Key points from literature from other writers on alignment is evidenced in the case study

The case study clearly identified that an adaptable approach was employed which as demonstrated by its longevity was capable of dealing with change. It was developed in a dynamic environment with clear links to the vision and the implementation required to achieving it. There was less evidence around the conscious process of considering the constraints and opportunities around human, technological and managerial aspects due in part to the creation of an environment which intrinsically extracted such factors into everyday working. None of these elements were subject to any measurement with the accountability arrangements being contained within the department to the CAS. Finally, little evidence base existed around the solutions other than visions of paperless environments, the knowledge within the participants and the ability to join up the 'jigsaw of factors' into a 'good' solution. These aspects highlighted in the literature were focussed upon characteristics required within any models which might be created in the future. The key aspect which emerged in the analysis was the rather static nature of the conceptual model which would stifle the use in a practitioners hands leading to a limited evidence base. This suggested that any future models must have a practical air about them if to be considered and deployed within the field.

6.3.5.4 Literature on systems approaches, process improvement, performance management and ISDM is evidenced in the case study

Widening the comparison to such writers who, although established within their own field of theory and practice, provided an alternative viewpoint to the business ICT alignment produced further aspects for validation within the case study being set out below. The first consideration was around Deming's SPK which as indicated earlier has the characteristics against which alignment might be considered. The CAS had demonstrated characteristics which were consistent with knowledge of a system (Deming, 1986, 1993) and he had identified the components of a system being the patient, digital hearing aids, digital

information, interface with manufacturers, staff use and workflow, underlying infrastructure and environment. Deming appointed a key member of staff to deconstruct the existing offering from the supplier and to rebuild in a way that would match the envisaged workflow from manufacturer to patient. This was communicated and the building was undertaken at the bench in close proximity of the service delivery. Iterations were then tested out as the solution developed and is consistent with agile aspects of ISDM. The intentions (of the system) were clearly identified and there were examples of management interventions to ensure the interdependencies worked and barriers were removed. This was communicated to all involved, who were totally behind the aims and goals, and was further evidence of the importance that leadership had made to the success and this was also shared with the supplier who concurred with the CAS's long term visions for the future. There was evidence that the supplier had participated in this development of a long term vision and that they understood their (customer) needs and wishes and responded accordingly. Successful attempts were made to align all the components within the service provision (system) and also within the wider organisation which formed the boundary which was slightly destabilised during organisational change, requiring adjustments to be considered. Some evidence existed that elements had to operate sub-optimally and this is perhaps exemplified around the integration problems with the wider IT and data processes. A number of the interdependence challenges between components were mitigated by greater communication and cooperation which appeared to be easier in a small department. This dialogue continued as the product solution became more widespread with the instigation of user groups moving the boundary from a local to an all Wales perimeter. Further evidence about sub-optimality was provided over where areas were disappointed (developments not supported) and no doubt, in their terms, being asked to work less effectively.

The impact of variation was perhaps less well understood where flexibility had resulted in different code sets, user screens, interfaces, database and data-field variations which resulted in difficulties of extracting data in a consistent way and made comparative work challenging and only came to light when subsequent changes in the system boundaries highlighted such variation. The supplier having developed the solution, without any apparent ISDM, to local requirements in Denmark, Scandinavia and the UK, implemented resolutions by making systems which were highly configurable but, not surprisingly, very diverse. In the UK, the underlying processes were to a large extent similar due the requirements to link with suppliers via one consistent interface to calibrate digital hearing aids but suffered weakness in connections or access to a consistent source of demographics which inevitably led to issues of data quality. Thus the products ability to support the processes (system) yet cope with variation led to complications later in the life cycle. A deficiency in training emerged which in some participants perceptions were limited due to the lack of 'knowledge' about audiology by the supplier. This gap was bridged by the CAS with leadership which remained omnipresent within the solution development and implementation identifying knowledge gaps in not only the obvious areas but also the individuals' softer, hidden ones which were immediately addressed. It was therefore the local department which provided the detailed understanding of the clinical processes which enabled the supplier to respond within an iterative process similar to a Plan-Do-Check-Act (PDCA) cycle. This approach allowed the staff to be fully involved in the design and creation of the solution by giving time, having authority and recognition to their achievements. Overtime, a variation has emerged with users having differing levels of knowledge about what the system can do, how they optimise its use or bring out additional benefits. This would suggest that the initial PDCA cycle no longer functions on a systematic basis. It may also have been compromised by the consensus approach required for improvements in functionality through the user groups or the

unwillingness to share experience because of competition between sites particularly in England. Additionally, as functionality develops or people move onto other roles then the knowledge transfer also weakens.

Deming suggested that creating a work atmosphere that nurtures intrinsic motivation is fundamental to establishing innovation and the level of motivation. A pride in achievements was widely apparent (evidence of intrinsic motivation) with participants being able to highlight their part in the success of the solution. It would suggest that the 'tone' set within the department had just the right level of leadership rather than tight control usually experienced within project environments. Minimal evidence of extrinsic forces being at work during the products life cycle was evidenced and participants were genuinely pleased to be part of the learning that had originated from this source. The findings suggest that some of Deming's key characteristics for future success were evident in the participants' responses around understanding the importance of systems and intrinsic motivation. Whilst absent initially they came to recognise, over time, the importance of reducing variation and ensuring that knowledge is maintained and transferred to sustain the benefits of the system. The principles found within Deming's SPK still appear valid. A consideration of any use of a performance framework perspective concluded that no clear evidence in the case study had emerged of any formal application of the approach but the case study did consider several aspects which are contained within methodologies such as BSC: technology, processes, information, stakeholders, and human resources.

Table 6-15 Components of Alignment writers on system approaches, process improvement and performance management

management
25. Long term view – constancy of purpose, long term relationship with suppliers 26. Customers – attitude to them most important, configure resources in customer-focused way, focus on value 27. Motivation – intrinsic and at all levels 28. Measurability – limited to success of working solution 29. Change process supports emergent approach- iterative 30. Interrelationship of culture, systems, components, organisation, stakeholders- is iterative in nature 31. Continual improvement – reduce variation, improve quality, reduce delays and defects, reduce cost – is continual 32. Understand cause and effect – iterative approaches 33. Training and knowledge- vigorous program of training education and self improvement, capacity and capability 34. Adaptability not static alignment, capable of dealing with change 35. Leadership – helping, integrate decisions into work, act on system, improve quality, employee driven change 36. Design – to support demand, value and flow, iterative 37. Communication – constant, purpose, two way, reduce fear 38. Outside in perspective – limited evidence

6.3.5.5 Key points from literature on systems approaches, process improvement, performance management and ISDM is evidenced in the case study

When considering all of the characteristics against the participants' responses 'Leadership' was perhaps the premier aspect visible and ran as a significant thread through all aspects of the vision links and to the day-to-day running of the revised processes which incorporated a long term view and supplier relationships through the necessary steps to achieve the benefits. Such aspects, supported by a training and improvement culture (not one of fear) drove a motivation of the participants to produce solutions which where adaptable, reduced variation; iinproved the processes, flow and the system by enabling decisions to be made at the appropriate time; and gave the patients a quality service.

It was concluded that these characteristics were important factors to enhance the ability for business and ICT alignment and should be incorporated into any future conceptual model. As indicated earlier the measurability was not a visible aspect nor a formal approach to the

business problem although the leadership did cast a wide eye across all the components to ensure alignment of approach was in place at all levels and all components.

6.3.5.6 Literature on critical success factors is evidenced in the case study

One of the benefits of the SIM studies data is that they cover similar timeframes as the development, deployment and support as the case study. This enabled a collation of factors at a macro level to be compared with the findings from the case study. The detailed summary of the research findings for the key enablers and inhibitors were outlined in chapter 5.6 where a number of enabling themes emerged from the participant interviews and these were compared with top 10 SIM survey results for enablers and the top six SIM survey results for inhibitors. The purpose of the comparison was to identify if there was a consistency of view between the survey and the case study, and to identify factors which needed to be considered when constructing a revised conceptual model.

6.3.5.7 Enablers

The top factors were previously outlined in Table 3-5 and a key differentiation when considering the results of the case study in the context of the SIM surveys is that there was no clear encompassing 'professional' area which constituted an IT Department at the time of the solutions inception and early development. The factors are considered in turn below.

6.3.5.8 Senior executive support for IT

The top five factors outlined in the surveys pertain to the relationships between the business and IT, personal relationships or executive support whilst the case study had the IT expertise all embedded within the department and linked to the supplier. That said the top factor, senior executive support, was apparent and the CAS did have the freedom to act based on his track record in the use of IT from the then, hospital management team.

6.3.5.9 IT understands the firm's business environment

Later in the review one of the inhibitors suggests that 'Business should understand business' and with that in mind prospective IT departments should respect that knowledge. Some divergence of understanding between business and IT was identified within the discussions particularly when further sites came to implement the processes and solutions. It suggested that fragmentation occurred when, for example, scheduling was to be undertaken in systems outside of the solution being implemented which demonstrated that the inter linking of process with IT or information requirements of the department were not understood. In the case study environment this factor was accommodated within the department which undertook the data transfer from manual to electronic and had to clearly understand the business within which they worked day to day. This manifested itself as they went on to build processes allied to what worked and benefits were leveraged through the integration of the workflow with the supply of digital hearing aids and electronic records thereby improving patient care. The supplier of the solution recognised the businesses limitations around the service environment understanding and took steps to identify the future developments through its gathering of likely changes from acknowledged practitioners from each geographical area which he described as ' light tower visionaries' (P1).

6.3.5.10 Close partnership between IT and business

The IT component within the case study was partly fulfilled by the supplier working alongside the CAS over a long period of time supplemented by other departmental staff which established a close working partnership (SIM 2007 Factor 3). This expanded through effective communication to deliver an iterative development process which embedded the local influence, ensured a long term relationship and the establishment of local product specialists trusted by the supplier over the period considered. This brought long term stability to the relationship and the solution.

6.3.5.11 IT and business personnel have close personal relationships

A more recent element (SIM 2007 Factor 4) identified in the SIM survey was the close personal relationships between IT and business personnel. This was present in the case study where effective networking with professional colleagues and a working environment with the supplier led to close interlinks between the future strategy of the business and the supplier. The aspects of trust between the participants were evident within the conversations.

6.3.5.12 IT plans linked to business plans

Attempts were made on an ongoing basis to set out and agree the likely future direction of the service which was established through a forum of service visionaries from differing parts of the suppliers' customer base. Described by P1 as 'light towers' this should have ensured that future requirements were available in a planned, ordered and timely manner thus linking IT plans to business plans (SIM 2007 Factor 5) although this was challenged by other politically driven influences (see inhibitors later).

6.3.5.13 Good communications between the IT organization and the business

As indicated earlier, communications between the supplier and the departmental business remained very effective (SIM 2007 Factor 6) although the involvement of the wider IT department was muted. In part this was due to the business champion having a good technical understanding and being able to articulate in a manner which was highly receptive to IT leads who were themselves within a period of development as a professional department.

6.3.5.14 IT organization demonstrated strong leadership; IT organization meets commitments; IT organization involved in business strategy development

The IT organisation as set out in the context of the survey was not a factor due to its peripheral nature in the early years when the Audiology department was largely self-contained. Therefore, in this case, the aspects of strong leadership (SIM 2007 Factor 7), meeting commitments (SIM 2007 Factor 8) or being involved in the strategy development

(SIM 2007 Factor 9) were not evident. However, aspects of this were present when considering the role of the CAS (leadership and visionary, strategic input) and the supplier (meeting commitments).

6.3.5.15 Clear ownership of IT-business alignment

One of the key factors in the success was in the area of ownership (SIM 2007 Factor 10) where the CAS was a clear champion, providing leadership at many levels including political, implementation, vision, opportunities and all round support to the departmental staff. This does provide an insight into a situation where the key visionary was directly involved in all aspects of making the solution happen rather than a part time role advising upon suitability which is typically undertaken from a distance. This could help to redefine the role of a clinical champion.

6.3.5.16 Additional Factors Identified

The case study participants gave up a number of factors which assisted the solutions success and these are consolidated into the following themes.

6.3.5.17 Business understands IT

The SIM surveys extracted from input from CEO's and CIOs inevitably had a high level approach to identification of factors that enabled and inhibited but the case study identified a number of practical aspects which were significant and may require further examination in other scenarios and research. The first additional factor could be described as that 'Business understands IT' evidenced by the wide range of knowledge which was demonstrated by all parties within the department and assisted in adopting a common working process within the workflow for Audiology. In some instances this was to have the confidence to challenge the established way of user displays offered by the IT developers or their testing regimes.

6.3.5.18 Culture

Within the departments was an aura of confidence that the work would succeed which was absorbed by the staff and supported by practical examples of open approaches and an enthusiasm of individuals to have pride in their achievements. This supportive culture had significant motivational results which established an increasing spiral of professionalism and pride of being leading edge implementers.

6.3.5.19 Environment

All of the success was undertaken in a more forgiving and easier political environment where local flexibility could be maximised to allow for innovation and manoeuvrability. Aided by a light governance regime the department could assess its own priorities without competing against other projects.

6.3.5.20 Development Process

Another significant aspect was that the scope of the solution was of a manageable size which could be resourced in terms of capacity and capability. This allowed the deconstruction of existing processes allowing reconstruction with the embedded benefits of introducing digital elements of data storage and information by products into the improved workflow. This recognised the fundamental user interface interactions and needs whilst making the process steps clear and free moving. As indicated above this factor was greatly enhanced by the iterative development process with coding done on site and with the departmental solution 'architect' who performed a key business analyst role.

6.3.5.21 Solution

Whilst many attributes can be identified which may improve alignment it was evident that the solution was beneficial because it worked as the users wanted. Having the equipment seamlessly linked to the clinical workflow and administrative scheduling produced a solution which provided benefits for everyone. This was underpinned by limited variations in the main

processes and interactions although later re-organisations would identify further areas where this could have been improved. It was, however, intuitive and gave by-products of secondary information to assist managers in their performance role without separate data collection. In addition the solution was stable, proved itself to have significant back-end strengths which was more important to users than the front end appearance.

6.3.5.22 Deployment

This confidence around stability and robustness no doubt influenced the support to achieve a quick transition from manual to the electronic record. On-the-job support or 'hand holding' was used to good effect and built upon the growing confidence and pride creating another virtuous circle.

6.3.5.23 Key points on Enablers

The case study had a number of unique qualities foremost in that a high level of technical expertise was evident within the department champion who demonstrated leadership at all levels. Thus the interactions prominent within the survey were closely coupled within the departmental environment. Considering the evidence that most of the top factors existed, albeit in a different combination, suggested that by bringing the design and development into the department and building in that knowledge environment lead to greater alignment of IT and the audiology business. This manifested itself through the clear ownership and vision brought about by the CAS, which partly redefined the interpretation of a clinical champion, and who in turn received support from executive colleagues on the management team.

However, more practical factors were identified through the case studies which need consideration despite not appearing within the top factors of the SIM surveys. Some of these could be classified as an environmental state and include issues as the knowledge required about technology within the department. This cross referenced to Luftman et al. (1999) who highlighted the reducing gap between the technologist and the practitioner as software's

become easier to develop and tools to maintain are more available. This therefore builds upon a wider knowledge base which has emerged over time as part of consumers IT experience as well as through higher level qualifications and academic tuition. The environment in the case study indicated that a lighter governance touch stimulated innovation and a balanced approach to risks although financially the main risks were borne by the supplier in its development stages. This supported and further extended the positive nature within the staff as they felt themselves to be in control, making a difference, and being leading edge in what they were undertaking, a virtuous circle.

The second major area was in the development process where locally developed solutions alongside the staff who were refining the processes and ensuring that the resultant development was in accordance with their clinical and administrative requirements. This familiarity enhanced iterative working with the prospective benefits being embedded at each stage of the solutions development whilst building the confidence in prospective users around the solutions resilience. As the same individuals were involved in this process then ownership of the final development outputs were readily accepted with a quick start implementation. The leadership issue once more became evident as individuals who were struggling received direct hand holding support until they became comfortable, transitioned to competence through to becoming strong advocates. It would appear appropriate to put forward the notion that in future alignment work these practical factors need to be considered in addition to those identified within the national surveys undertaken by SIM.

6.3.5.24 Inhibitors

The categorisation of inhibitors can easily become a reverse set of the enablers but with the exception of a couple of examples this has been avoided within the SIM survey factors which are considered in turn below.

6.3.5.25 Lack of senior executive support for IT

The top factor identified in the survey is one of the examples of a reverse enabler mentioned in the introduction and is around executive support. As indicated above within the enablers (SIM 2007 Factor 1) the CAS had freedom to act in producing this solution and such restrictions were minimised.

6.3.5.26 Business units' lack of understanding of the firm's business

This aspect was referred to in the narrative within the enablers section but this is set out as a specific barrier within the survey (SIM 2007 Factor 2). The department clearly understood the business they were in and were able to communicate this to the supplier during the design and development phase initially and onward as the product was supported. It was also acknowledged that the supplier, the IT providers, who did not understand the audiology environment, required the partnership arrangement in order to succeed. This avoided any additional outside experts which in itself can affect the ownership of any problem or subsequent solution. However there was evidence that this factor has some substance in that the department did not consider the wider aspects of integration with other corporate systems notably its PAS.

6.3.5.27 Business units' lack of support for corporate-wide IT initiatives

The department was largely self-contained in terms of its use of technology and the corporate IT department was in its infancy in terms of impact and reach. Thus the design was not constrained by the local IT infrastructure or aspects of standardisation which may have resulted. The case study did bring up examples in other areas where there was a conflict

between audiology solutions and corporate solutions resulting in a sub-optimal approach to the deployment e.g. scheduling to be undertaken within PAS. The other factor identified was around standardisation of codes and user interface where more corporate approaches would have made message integration with other systems more readily achievable.

6.3.5.28 Lack of clarity and predictability of corporate goals and directions

The public sector particularly health services are prone to politically led improvements which tend on the whole to be unpredictable in their announcement and contain a lack of detail particularly around their impact on alignment. The supplier (P1) highlighted the frustration of having to develop amendments and solutions in a short period of time when longer notice would reduce what became iterative changes. In addition, some of these changes can be quite profound and jeopardise the principles that secondary data should be by-products of the operational process demonstrated in the case study around referral to treatment targets [RTT]. Finally, even where the direction is relatively clear (e.g. market economy within England) the unintended consequences can be profound seen with the examples around weakening of the user group requests.

6.3.5.29 Business units competing for IT resources rather than sharing

One of the key conclusions identified earlier was that the light governance enabled the department to focus upon what was required without compromising around solutions or resources. In a resource constrained environment this aspect could impact greatly leading to functionally mediocre or sub optimal solutions. The case study demonstrated that the solution required to provide benefits through a clinical workflow supported by an available electronic record to access patient data and schedule appointments was very successful because the development was not constrained by corporate interventions, constraints and trade-offs.

6.3.5.30 = Business communication with IT = Resistance from senior executives

These inhibiting factors were within the category identified as contrary to enablers and were mitigated by the meld of IT knowledge and department practice knowledge within the department the details set out in previous paragraphs in this section. As indicated the champion has freedom to act and was well supported and encouraged to deliver a solution for the department whilst having a by-product of potential income generation for the hospital.

6.3.5.31 Additional Factors Identified

In part due to the success of the development and operation the case study participants gave up a limited number of factors which could have affected the solutions success but these have been consolidated into the following themes.

6.3.5.32 Transitioned data quality compromises the new solution

One of the key inhibiters identified within the case study was around the state of the data quality of the manual records, how they would be transferred from the manual to the electronic record and the resources required to undertake this transition. The initial preparations had identified that some records were incomplete and in other cases patients had deceased but had not been amended. This highlighted a key transformational barrier over the state of completeness of records and whether to start a clean database or transcribe the old data once cleansed.

6.3.5.33 Fit for purpose solution

The enablers, and to some extent the inhibitors, provide a focus on the relationships and understanding between the business area and the associated IT departments. Whilst understanding a business environment is a key enabler it does not necessarily translate into a solution which will provide benefits to the clinicians. In the case study this was avoided through close working between the developers and participants but recent evidence from the NWIS delivery schedule of national programmes has shown how this can easily dilute the

delivered products. This has taken the form of delays, de-scoped deliverables and work arounds despite having a process which in theory should have taken into account the wider clinical requirements. In the case study, it was evident early in the development cycle that the proposed solution would not fit the envisaged workflows and other ways of working within an audiology environment. This would have been a considerable inhibitor to any proposed solution implementation. It was also supported by the identification of an appropriate robust back-end solution consistent with the task unlike some of the competitors in the supplier market place who chose low transaction volume software not scalable to an NHS environment (P2). The ongoing aspect to the software is around the need to ensure future developments and improvements are consistently integrated into the product suite with robust testing (P7) and quality assurance of the solution (P1). Thus initially solutions may appear successful but wane over time as priorities of suppliers or an IT department are directed elsewhere or in the case of external IT companies, change of ownership (P7). One key aspect highlighted within the case study which the participants were unable to come to a conclusion over, whether it was an enabler or inhibitor, was flexibility to configure a solution versus the necessary control to stop unauthorised changes (P4).

6.3.5.34 Supplier

The selection of the supplier in this case study is unlikely to happen in the current environment when aspects of procurement rules within the European Union, Standing Financial Instructions (SFI), Standing Orders (SO) around supplier selection and economic pressures within the supplier market place are considered. The survey does not consider the factors around the new or small start-up companies who whilst wishing to obtain new business, demonstrate flexibility and innovation have no track record or significant customer base. This is now being addressed in Wales through the Small Business Research Initiative (SBRI). There is also no guarantee that the supplier will be in place over time, working as

they do within a dynamic market place where takeovers, mergers, and failures are not unique events. This questions as to what considerations should be given to the ongoing aspects of suppliers in the long term. This contrasted with the case study supplier who had by the end of the period reviewed established almost a monopolistic supplier position (P1, P2).

6.3.5.35 Governance

However, over the passage of time, increased governance has been introduced which has impacted upon the development potential and was recognised as having a limiting effect of developments (P2). This was initially limited to executive oversight at a distance but increasingly with the MHAS initiative in place a growing level of formality was introduced as the solution was made available through a formal tendering process. In the case study example this had a beneficial effect in that the oversight brought with it resources and a direction although in a constrained environment this will be more challenging to continue. At a local level competition has become more acute and prioritisation of investments more the norm resulting in delays from a business perspective. This also brings in the increased influence of larger business areas within the Health Board which can marginalise smaller departments whether their requirements are appropriate or not.

6.3.5.36 Key points on Inhibitors

The case study provided some evidence that lack of executive support, although avoided, could have provided an inhibitor with examples quoted of an increasingly difficult barrier developing as governance aspects became more onerous and far reaching. Such governance can have several effects and the experience of the participants (P2) was that such restricted approaches in place today would have affected the ability of the department to receive investment, undertake the development in such an informal structure, stifle innovation, and reduction in scope. This can lead to a focus upon risk identification (formal project activity] rather than risk taking. It can also jeopardise the ownership of the proposed solution and the

outcome. Contrary to the survey results, the business participants fully understood not only their business but also the vision which was important in an environment of significant step change in order to supply digital rather than analogue hearing aids. Whilst the detailed business and clinical processes were clear at the start they were questioned on a several fronts over time posing new challenges. First, was the wider IT hospital initiatives which became more evident later in the life cycle as integrated processes, electronic message exchange and data standards became more important and necessary. Secondly, was the lack of clarity and predictability of corporate goals and directions which the case study was able to provide evidence not only of instance but also consequences which in some cases were unexpected. Outside of the survey, the case study highlighted the importance of not just understanding the relationships but the importance of an appropriate solution which provided benefits but was capable of becoming part of the background infrastructure (P6). In this the choice of supplier was key in order to establish a long term relationship. The lack of conclusion over flexible configuration versus standardisation and control may well best be summarised by the supplier (P1) who suggests in his responses that it is a life cycle reality that early on it is necessary to be flexible to complete the transition whilst accepting later there will be a necessary consolidation and standardisation activity to bring the product suite under a managed QA environment.

6.3.5.37 Key points from literature on critical success factors is evidenced in the case study

The comparison indicates that one of the initial aspects to be considered is the wider environment which can provide an indication of what constraints may be present during the investment period. This does not feature within the SIM survey but was highlighted in the case study by reference to the: political direction and policy making; economic pressures and priorities linked to policy; social changes in the use or deployment of technology; changes in service, equipment or appliances; state of the supplier marketplace highlighting monopolistic

positions, takeover and merger potential; governance requirements and levels of assurance required. All of these are components found within an external viewpoint which can be structured under the headings of political, economic, social and technology (PEST) and will have bearings on the overall alignment as well as potentially becoming constraints to progress. Like all risks they will need actions to mitigate their effect. The second area exemplified by the survey is the interactions between the stakeholders who all have varying requirements or views to be taken into account when considering alignment. The needs for business and IT to understand each others future plans and actions are well demonstrated in the survey but in a Welsh public sector these must be joined by: the WG; its devolved Health Boards; executives and non-officer members of those Health Boards; and ultimately managers and staff delivering the service. All of these will take into account interactions with patients who are being encouraged to share and comment on their experiences. This highlights a complex web of potential requirements, expectations and perspectives to be considered. Each of these groups will have their own goals and priorities some of which; as demonstrated in the case study (patient scheduling in enterprise wide systems rather than embedded within departmental systems) will conflict. The positioning of technology with the business will therefore require a robust collection, normalisation, analysis and sharing to ensure the multiple stakeholders will see their expectations emanating from or unaffected by the alignment. The case study identified that over the last years some of the approaches around governance would not be supported whilst no top level enabler or inhibitor in the SIM survey overtly highlighted financial perspectives as a significant factor to be considered. The expectations in this area for a public sector go beyond the normal investment criteria associated with commercial companies into demonstrating publically value for money through the principles of the three E's: economy (inputs – less spending); effectiveness (outputs – targeted spending); and efficiency (results – wise spending) (Otrusinova and

Pastuszkova, 2012). The case study, although able to demonstrate high benefits in hindsight, was not tested by this set of criteria but future alignment possibilities will need to be aware of the assurance requirements. This will be enforced through the governance arrangements put in place and whilst the case study experienced light governance this may not be the case in the future and constraints to freedom of action in this area will need to be identified. Additionally, the likely 'competition' for resources is another constraining factor for potential projects and until differing situations occur remain well informed by the closeness of personal relationships and track records. Finally, the environment put in place around the governance will also be policed through the organisations rules around procurement as embodied within SO's and SFI's which will also constrain the ability for flexibility around procurements or supplier engagement. All of these factors are the modern context upon which to consider alignment decisions. The SIM survey focuses on the factors but does little to highlight what steps or actions will be required to put these in place to achieve success or avoid failure. Taking examples from the case study and the headlines from the survey it is possible to identify some of the critical processes which must be in place around the business and IT agenda. Building relationships features heavily in both examples so that the business and IT can understand each others; business, plans, knowledge, constraints and level of partnership working. This will allow subsequent refresh and revisions over time. However, as demonstrated above the stakeholder perspective requires wider exposure in the internal processes which will require higher levels of communication and a multiplicity of levels. The solution can then be developed to ensure the workflows are within a framework of understanding of the whole system rather than components or partial segments. The workflows must be processes which are standardised with the agreed area, have limited variations, and link to the IT and information infrastructure. The development is best undertaken in an iterative way with close proximity of the prospective users and developers

whether internal or external to build upon local knowledge and experience. Where possible experienced business side staff can assist the development through the medium of a shared development language (see later). This aids early identification of issues, earlier testing and quality assurance and thereby locks in the benefit requirement into the development. In satisfying the requirements the development should be set up to be well planned, timely and enable quick transitions. With the case study providing some good examples the SIM survey has little reference to the more intangible assets requiring alignment in order to assist readiness. Prominently within the case study is the aspect of leadership which is demonstrated at a visionary, political, resource, technological, implementation and support dimensions. Allied to this was the culture of ownership of the vision and its solution embodied in the good relationships, freedom to act, empowerment, trust and professionalism across the wide spectrum of staff involved in the solution. In support of this was a good knowledge base which included clear understanding of the business, workflows, methodologies and analysis. The potential of technology to radically change the way of working was widely apparent in the project team which aided the design and development of the solution enabling developers and business to communicate in a shared language (P2). Not unsurprisingly the final part surrounds the IT or Information Capital as Kaplan and Norton (1996) describe the information and IT infrastructure. Key to the alignment remains the 'maturity' of the IT infrastructure when considering the changes and also the robustness and resilience of supported solutions. In a data sense this can also be applied to underlying data set being collected prior to any transition with its data quality being a key determinant of success and adoption by users. During the longitudinal journey in the case study the impact of wider integration became more critical as the message exchange and general integration with other systems became more prominent. The capability and capacity of the IT to support any changes requires reflection prior to changes being introduced. As a final reflection the

analysis presented the thought that the CAS had a clear and personal idea of what constituted a CSF in the examples articulated around the receptionist support at the start of the go-live period, provided for two to three days, suggesting that identification and action around success are not always clearly articulated in advance.

This section has identified the key critical success factors outlined within the SIM survey (Table 6-16) and compared them with the case study for validation. The case study identified further dimensions which were identified as factors and have demonstrated that they are transferable to a public sector environment in order to examine the potential for improving alignment (Table 6-17).

Table 6-16 Enablers and Inhibitors SIM Surveys (Luftman and Kempaiah, 2008)

X	Enablers 2007 Survey (Luftman and Kempaiah, 2008)		Inhibitors 2007 Survey (Luftman and Kempaiah, 2008)
39	Senior executive support for IT	49	Lack of senior executive support for IT
40	IT understands the firm's business environment	50	Business units' lack of understanding of the firm's business
41	Close partnership between IT and business	51	Business units' lack of support for corporate-wide IT initiatives
42	IT and business personnel have close personal relationships	52	Lack of clarity and predictability of corporate goals and directions
43	IT plans linked to business plans	53	Business units competing for IT resources rather than sharing
44	Good communications between the IT organization and the business	54	= Business communication with IT = Resistance from senior

			executives
45	IT organization demonstrated strong leadership		
46	IT organization meets commitments		
47	IT organization involved in business strategy development		
48	Clear ownership of IT-business alignment		

Table 6-17 Enablers and Inhibitors – Case Study

XI	Case Study Findings		Case Study Findings
55	Understand future plans, actions and expectations of Welsh Government; devolved Health Boards; Executives and Non Officer Members of those Health Boards; and managers and staff delivering the service.	70	Financial instruments (SO's, SFI's, Procurement rules)
56	Interactions from shared patient experiences	71	Maturity of the IT Department and the infrastructure
57	Building relationships to understand business, plans, knowledge, constraints, partnership working	72	Robustness and resilience of supported solutions
58	High and multiple levels of communication	73	Data quality of existing collection and presentation methods

59	Develop within a whole system context	74	Maturity of integration between systems, message exchange
60	Create workflows which are standard, have limited variation, and are linked to IT and information infrastructure	75	Capacity and capability to introduce change
61	Developers use iterative process close to the prospective users using experienced business personnel to reduce issues through quality assurance, improve testing, and ultimately deliver benefits	76	Political direction Policy making and priorities Governance requirements Levels of assurance
62	Create shared languages between developers and business personnel	77	State of supplier market place Monopoly suppliers Takeover and mergers (consolidations)
63	Run a well-planned, timely development and ensure a quick transition	78	Changes in the use and deployment of technology in society Changes in service, equipment or appliances required
64	Leadership and responsibility at vision, political, resource, technological, implementation and support dimensions	79	Changes in the use and deployment of technology in business environment
65	Ownership of vision supported by good relationships, freedom to act, empowerment, trust and professionalism	80	Accept to risk balance with innovation

66	Good knowledge base over business, its workflows and processes, improvement methodologies and analysis, role of technology in future	81	High level of technology comprehension
67	Three E's: economy, effectiveness, efficiency	82	Fit for purpose solutions is paramount to successful acceptance, deployment and continued use (fades to background test)
68	Governance and assurance requirements, resource prioritisation	83	Status of any supplier, ability to deliver over a long period of time in a consistent manner.
69	Freedom to act		

6.3.6 Summary of Comparison Three Analysis

This section highlighted:

- the common aspects emanating from other writers
- the validity through the case study of their suggested improvements to any future conceptual models
- with the focus upon the public sector the original conceptual model has been developed to provide a more robust and relevant approach towards identifying factors which will improve alignment of technology and services
- through reference to survey information and case study findings a revised set of critical success factors (enablers and inhibitors) which have been compared
- additional factors have been identified requiring consolidation and normalisation.

6.4 Consolidation of Comparison Phases

This section has undertaken three phases of comparison.

Firstly, an analysis of literature with available models (model and methodology applicability) where:

- no one model was deemed to present as in the ascendance although aspects of MSP, BSC and ST, as compared, would provide knowledge and aid alignment decision making
- practical related components were consistent with those factors presented within the literature.

Secondly, an analysis of models and methodologies with the case study findings (model and methodology usage) suggested:

- that, initially, no conscious use of methods methodologies or best practice was identified
- upon deeper analysis the factors from the literature had been addressed and was evident from the reflections of the participants
- focus on a number of areas which had caused concern led to the deduction that use of the structure found in some of the practical models and methodologies would have served to be useful in order to elicit responses and highlight their use as a checklist of areas and potential dependencies.
- potential contributions ranged primarily across three of the practical approaches outlined within the first analysis with additional characteristics from other methodologies.

Thirdly, an analysis of literature with the case study findings (literature issues validation) highlighted:

- common aspects emanating from other writers and demonstrated their validity or otherwise by comparison with the case study.
- the ability to update the original conceptual model after challenge to provide a more robust and relevant approach which would improve alignment of technology and services.

However, the original conceptual tool remains in a format which cannot easily be used to support practice and therefore a more intuitive and iterative approach is required to draw together the strengths of current methodologies, characteristics from the literature and insight derived from the case study evidence. A new approach is considered in the next section.

6.5 A Revised and Relevant to Practice Frame of Reference

Future models should encompass the ability to treat alignment as a process rather than an end state (Chan and Reich, 2007) or to approach from a process or outcome perspective (Reich and Benbasat, 2000). The case study clearly identified that an adaptable approach was employed which was capable of dealing with change having been developed in a dynamic environment with clear links to the vision and the required implementation. There is not 'one design fits all contexts' in alignment (Ciborra, 1997, Brown and Magill, 1998) and the case study outlined the impact of one implementation approach not necessarily being a smooth transition or acceptable outcome. An adaptable model, as Maes et al. (2000) warned is important, amplified from the case study responses where real life organisations with differing organisational structures and business processes and operating in differing environments really required different approaches to alignment but remained constrained. This suggests that if organisations wish to "install" alignment as a practical tool (Maes et al.,

2000) they should consider it as dynamic process, operating at different levels and ranging from strategy to implementation. Hsiao and Ormerod (1998) refer to the turbulent environment requiring businesses to modify and extend traditional approaches to change which is also queried by Galliers (2004) who highlights the issues of how to align ICT that is relatively fixed and implemented in an organization challenged by a business strategy and associated information requirements that are constantly in need of adjustment. The case study set out some of the changes and challenges which were met over the period under review and highlighted the importance of a long term view both operationally and with a supplier. These are underpinned by Deming's long term view for future success which was evident in the participants' responses. However, any model (conceptual or practical) will also need to encompass or codify what can be described as knowledge of the subject area in the same way that medicine or engineering has developed which ultimately aids decision making, practical approaches and consistent success. Understanding and thereby being able to promote the importance of holistic systems which are more standardised and therefore reduced in variation will contribute to the store of knowledge which can be transferred to sustain the benefits of the discipline.

6.5.1 Linking the literature and case study findings to the Frame of Reference

The objective of this research was to seek out approaches to improve alignment of public services and ICT in an environment where no comprehensive model or framework is commonly used in the public sector. Based on the foundations of the work of prior authors Luftman (1996), Luftman (1997) and Papp (2001) the intention was to produce a functional application of strategic alignment and test the theories and methods in a practical manner in a real life situations and organisation to improve the knowledge base as suggested by Avison et al. (1999a, 1999b). As Maes et al. (2000) noted the starting point that almost all later models and consulting practices in alignment start from is the SAM (Henderson and Venkatraman,

1993) and this has continued in the analysis undertaken within this research. However, the initial conclusion concurs with Maes et al. (2000) in that any attempt at transforming the concept of alignment into a practical method will therefore need a reference framework incorporating strategic and implementation perspectives. The case study does not conclusively concur with Silvius et al. (2009) that the approach is a traditional methodology highlighting business leading IT, and agrees more with the more holistic view to be found with Henderson and Venkatraman (1993) and Poels (2006) over mutual influence of business and ICT. This was highlighted where three methodologies had frameworks which could encompass and address a good proportion of components identified within the literature and whilst some gaps existed it was possible to link the requirements to at least one approach within the model portfolio. This had to be balanced by evidence from the case study which upon deeper consideration of participants responses suggested that some structured approach possibly through a model or methodology would test understanding and promote areas of concern in order to lead to decisions. In turn this could lead to their use as a checklist of areas and success factors (where evidence can be found), an area which is considered earlier within this chapter. In addition, some of the process improvement techniques, particularly the ones rooted in the Deming's principles, although not consciously used, had resonance within the case study findings which added validity for the use of appropriate principles contained within ST and would further improve the longer term responses to demand, citizen requirements, design and ultimately alignment. Future models also need to capture any tensions between local service delivery requirements and national ICT approaches which have become focused at a high level across a number of differing public services as opposed to a process and workflow perspective so successful in the case study. The human factors (Maes et al., 2000), in previous conceptual models, occupy two quadrants which are now merging into a diminishing gap between considering business and technology as separate

entities. Approaches now require key leaders to have the confidence to deploy technology as well as the service knowledge and experience, factors clearly demonstrated within the case study. This close association questions the value of any future assessments having any segregation between organisation and IT skills which also begin to bring together factors around staff empowerment and their respective responsibilities with characteristics expected within leadership. Assessments need to change in this area and must focus more on identifying their resources capacity and capability available in order to achieve the vision and resultant stakeholder requirements rather than competences which although useful will not add value to any conclusion.

The literature in the approaches to alignment in chapter three highlighted that IT-enabled strategic change involved the interplay of strategy, structure, people, management processes and technology (Hsiao and Ormerod, 1998, Luftman et al., 1999) which firms have to negotiate with collectively to achieve advantage (Hsiao and Ormerod, 1998). The case study referred to a service strategy being more appropriate than business strategy and identified one key area which is not clearly captured in the current set of conceptual models being the links with the wider external environment. In particular, in a public sector context this should identify some of the political directives being delivered within the prevailing economic conditions whilst recognising changes of attitude and behaviour in society particularly in regard to the type, availability and use of technology. Avison et al. (2004) highlighted the importance of implementation and planning taking place as a dynamic process whilst being flexible enough to allow an organisation to take advantage of opportunistic developments, without having to improvise and disregard all planning which provides a challenge for any model to be practically relevant, not just conceptually relevant (McKay and Marshall, 1999). Deming (1986, 1993) also highlights that organisations require the components of a system to be clear and their interdependency fully understood and this is further expanded by Seddon

(2002, 2005, 2008) who also advocates the need to think as a system and to clearly design any solution around the demand of that system. This will in turn determine factors and responses to facets around stakeholder requirements and in the public sector subject area more attention needs to be given to identifying this wide range of stakeholder relationships to highlight what benefits accrue through the pursuit of a vision using alignment as an enabler. The rapidly merging use of technologies in the service environment, highlighted in the study, demonstrates the importance of key leaders having the confidence to deploy technology as well as having and displaying the service knowledge and experience. Such important leadership underpinned by a forgiving culture in governance terms needs consideration of human resource in the context of skills, capability, capacity and the organisation. Such merging of technologies, business models and their joint consideration is also consistent with the work identified by Luftman (1996). The right approach to the delivery of strategies, designs and development and the need for their identification came from the evidence around the critical success factors surveys (Luftman et al., 2006, Luftman and Kempaiah, 2008, Luftman et al., 2009, 2012). This suggests that processes are key and identification of these key deliverables is another important aspect to be understood and identified whether they be closer working between the service and ICT or communications at all levels and strands of work. The static nature of the conceptual models identified would stifle their use in practitioners hands. In the case study the development process saw local developed solutions alongside the staff who were refining the processes and ensuring that the resultant development was in accordance with their clinical and administrative requirements. This was enhanced by iterative working with the prospective benefits being embedded at each stage of the solutions development whilst building the confidence in prospective users around the solutions resilience. Measurement of progress during this process remains important (Peak et al., 2005).

Therefore when constructing an approach or frame of reference the literature and case study suggests that any approach should as a minimum be clear as to the:

- overall purpose of the system which in turn will achieve the overall vision in line with stakeholder expectations through service strategies
- external drivers which should consider stakeholders alongside the changes with the political, economic and technological dynamics
- component parts of that system which will be interdependent and include aspects of vision, strategy, stakeholder expectations, processes, human resources and technology.
- key processes that will deliver the changes must be clearly identified with design and development undertaken in an iterative manner thus suggesting that the model must adapt and operate within a dynamic environment
- measurement process to be used to gauge alignment.

The next section considers these components in the context of available methods and methodologies.

6.5.2 Linking the literature with available methods and methodologies

The development of the model commences initially from the process outlined within the ALIGN methodology (Papp, 1999) being a set of high level steps through to alignment which uses components from other models to assist with the approach to each step also being capable of repeatability and supporting sequential iterative work. The first element is derived from one of the important features of the MSP Blueprint which is the ability to assess current and future states and thereby identify transformation required through a number of differing areas under the acronym POTI being processes, organisation, technology and information quadrants. These areas are mirrored within the BSC through its vision, stakeholder/or

customer, financial, processes, leaning and growth perspectives. This has additional capabilities as outlined by Osama (2006) being: use of perspectives to 'achieve' balance between multiple performance dimensions; establishes cause-and-effect linkages between various performance perspectives; provides a mechanism to map an organisation's strategy; replicates the BSC throughout the organisation by 'cascading'; puts BSC at the centre of the strategic management framework; and ensures structural flexibility and adaptability to various organisational forms and circumstances. ST brings a practical aspect around dealing with demand which reinforces the requirements around the stakeholders' perspectives and sets out some of the conditions that will effectively enable the environment to empower the organisation and individuals to reduce variation, improve quality of service and eliminate inefficiencies (failure demand). Therefore, as previously set out in Table 6-7 there is some overlap existing between the three wider component inclusive methodologies which would benefit from normalisation of approach. Where BSC has an intuitive aspect, particularly utilising the strategy map visual representations, to considering perspectives the MSP brings about a more structured approach to identifying the current and future state. Although MSP and BSC have aspects of transition their communication can be challenging which provides the opportunity to consider technology road mapping principles to improve the display via its graphical approach to presentation and highlight the timelines associated with change. Finally, the agile qualities from ISDM can help facilitate the necessary iterative nature of the alignment through linking all of the components identified via the previous articulated models and methods. Supported by the environment to be created through the system thinking principles a merging of these aspects into one source makes it possible to produce a FoR capable of being used for alignment in practice. Moreover, with the evidence base surrounding the five approaches the practitioner has access to a store of knowledge which can be utilised to consider what tactic is best suited for their particular problem. A way of then

extending these perspectives can be derived from the PJM section where the use of work breakdown structures (Haugan, 2002) can assist in giving focus to particular work-streams ready for the production of discrete packages of work.

6.5.3 Constructing a Public Sector Strategic Alignment Model (PSSAM)

It is therefore clear that any future models must incorporate a practical approach in order for them to be considered and used with more enthusiasm within the field. To achieve this the model initially considers the requirements derived from the literature, case study findings and those models and methodologies tested earlier in this chapter 6. The creation of the presented PSSAM (Figure 6.1) was following a number of iterations which centred around the key elements previously described. The right hand side of the model is an amalgam of the BSC and MSP Blueprint utilising the road mapping approach to mapping the transitions. The left hand side of the model considers the external environment through a simple PEST model although this could be extended and used in conjunction with a number of similar models i.e. PESTO, PESTLE. The links and the steps in the cycle were then added to identify the importance of the external environment and the development of the service vision through the steps into establishing the current and future states to be achieved thereby identifying the transitions required over many key components. The iterative nature within many ISDM approaches is highlighted in the flow identified to clearly highlight that this is not a static model but one which has to be dynamic with all components subject to review and change over time.

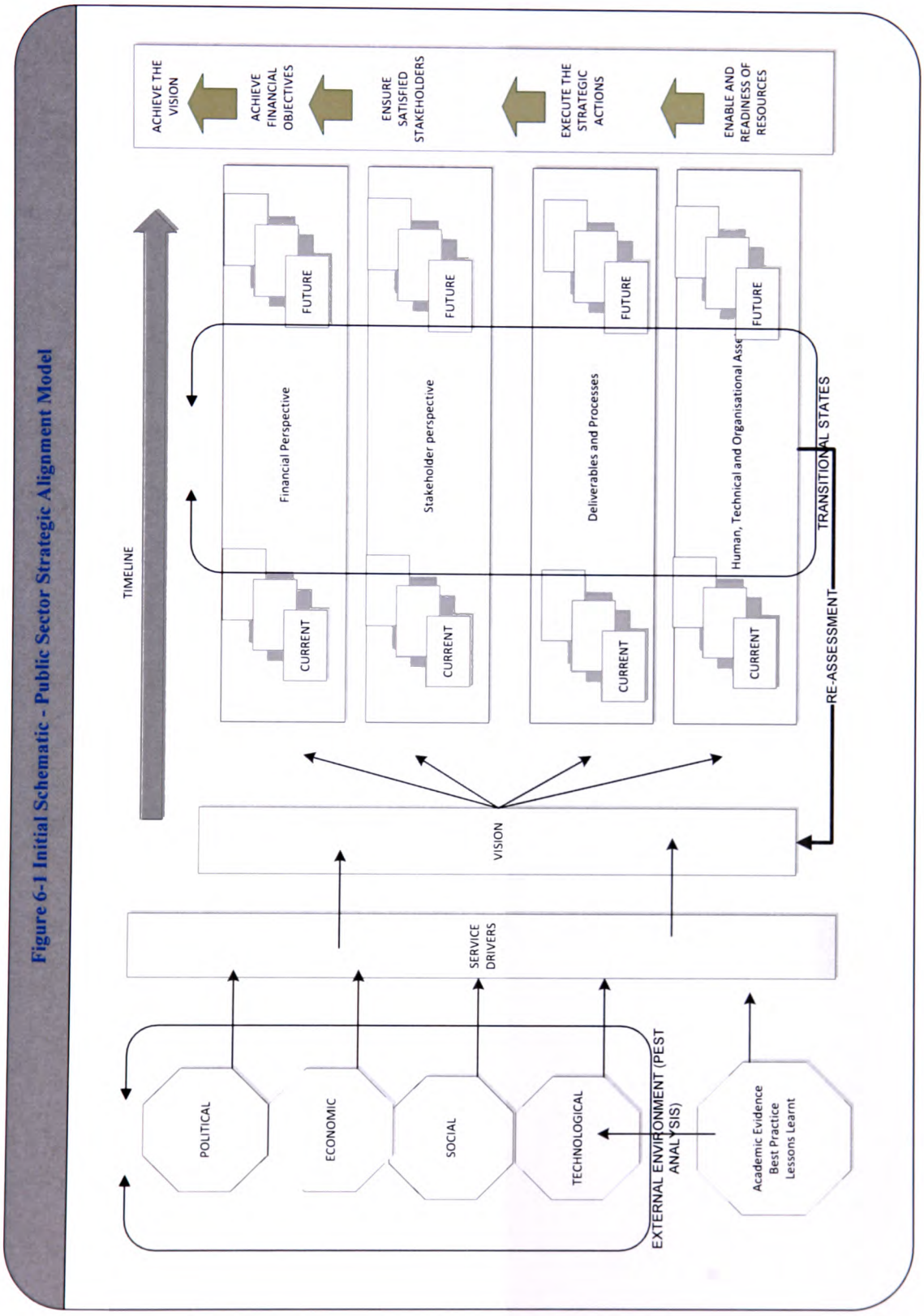
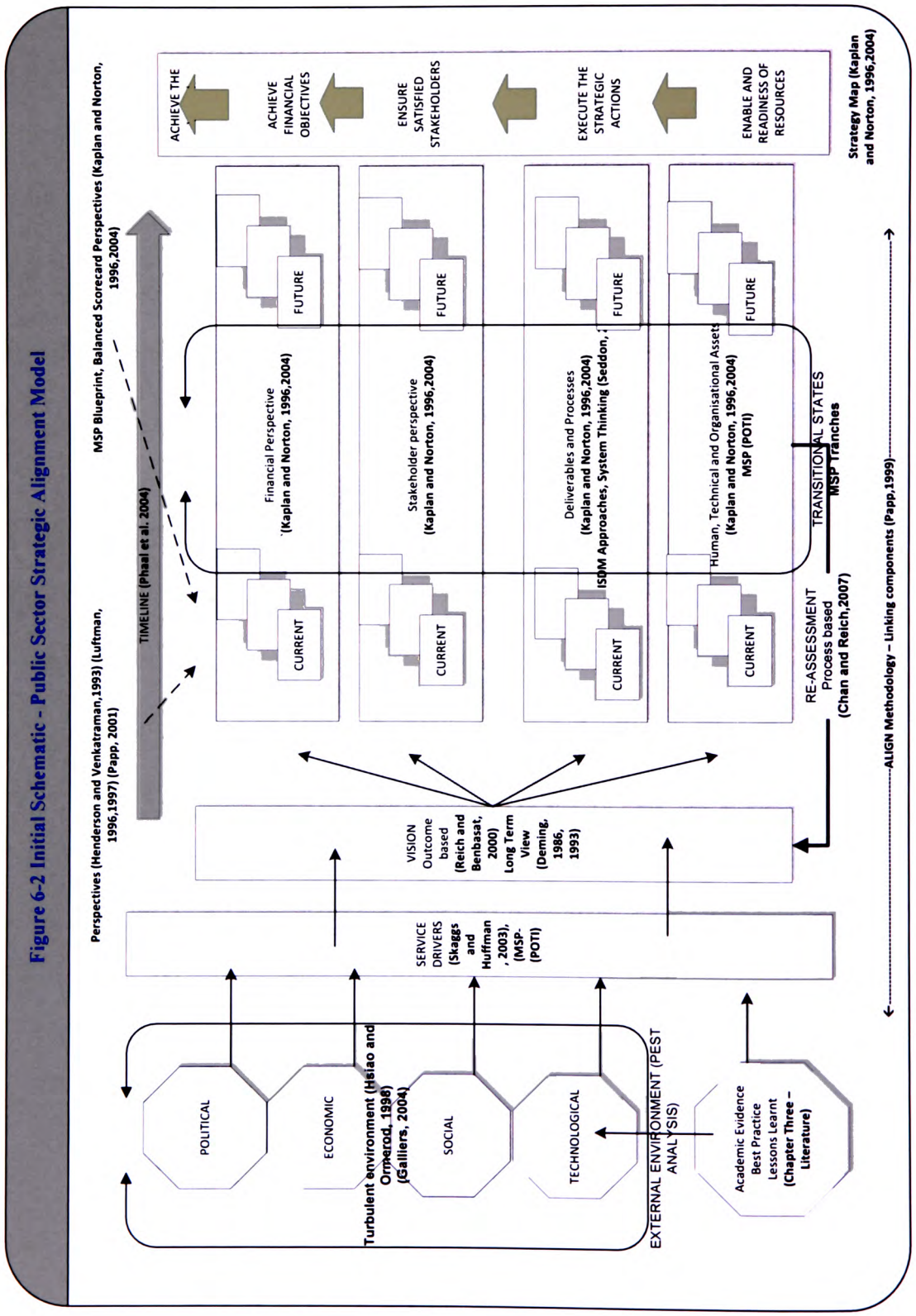


Figure 6-1 Initial Schematic - Public Sector Strategic Alignment Model

To provide more clarity over the literature sources embodied within this model the figure has been re-presented with annotations overlaid on the components in Figure 6.2.



To be considered fit for practical use in alignment this PSSAM required supplementation with tabular detail to highlight key areas of interest or risk and this was achieved in two phases being the external element and the internal perspectives.

6.5.4 Using the external element of PSSAM

The proposed PSSAM recognised that, with technology, considerable changes within the environment regularly occur and this is particularly relevant in a political environment such as the public sector. A simple PEST analysis was utilised, although this could be substituted by a number of published variations, with the outcomes derived from this influencing the service drivers with the PSSAM. A further mapping exercise took place around aspects drawn out of the work to assist the practitioner and although a number of factors were highlighted within the case study (Table 6-18) little was identified at a specific level in the other areas of analysis. The context of the research did yield elements: political aspects - governmental and European regulations – ethics, green agenda, equality, environment, safety (service governance (3)); economic – financial constraints, drive for the 3 E's (Welsh Assembly Government, 2003), collaboration and provision of national services; social aspects - expectations of citizen and stakeholder – including effect of social trends (e.g. access via mobile device) (service scope (1)); and technological - external perspective required (information and infrastructure (13)). In addition, the analysis in section 6.3 identified the value of fundamental and substantial knowledge contained within the literature and best practice models and methodologies (O'Brien, 1995). These have been added to the PSSAM as contributory factors to be considered when establishing the service drivers and ultimately the vision. They also contribute to the wider consideration of enablers and inhibitors.

Table 6-18 Research Context, External Enablers and Inhibitors from the Case Study

External Perspective	Research Context (Chapter Two)	Enablers and Inhibitors
Political	Governmental and European regulations – ethics, green agenda, equality, environment, safety	Case Study (76) Political direction including National drivers and initiatives (e.g. ICT) Policy making and priorities Governance requirements Levels of assurance
Economic	Financial constraints Drive for the 3 E's No market economy to provision of public services Collaboration and provision of national informatics service	Case Study (77) State of supplier market place Monopoly suppliers Takeover and mergers (consolidations)
Social	Expectations of citizen and stakeholder Effect of social trends	Case Study (78) Changes in the use and deployment of technology in society Changes in service, equipment or appliances required
Technology	Developing nature and use of technology to support a digital approach to service provision Cloud storage, mobile device access, enterprise approach to processes and information	Case Study (79) Changes in the use and deployment of technology in business environment

From a practitioner perspective all of these factors combine to set the objectives and constraints for the service drivers which are necessary components for identification and development of the vision.

6.5.5 Using the internal element of PSSAM

The first element internally draws on the external analysis with the outputs forming the basis for the service drivers identifying not only the requirements to be formulated as part of the vision but also the constraints which include capacity and capability. To achieve the vision the underlying methodology which underpins BSC is proposed with an interlinking of the strategies required to achieve with the differing perspectives across the stakeholder, financial, internal processes and the learning and growth perspectives. In sequential terms the aspects around stakeholders and financial perspectives require analysis and identification, coupled to the internal process required to deliver them supported by the intangible assets of human, technical and organisational capital which constitute the state of readiness. By modifying the more common visual representation of the BSC strategy map approach in this area, placeholders are presented to identify the current state perspectives and the required future states. Once agreed the resulting gap becomes the necessary transitional state to be achieved through projects or organisation changes initiatives. To aid performance management of change and in addition to the usual set of performance criteria to be measured are a series of interim positions on the transition which is proposed, similar to tranches in MSP. However the dangers of binary targets rather than measurement of progress during this time should be avoided (section 3.5.7). The whole process is repeatable and the components, see later, can be adapted to particular service components. The next phase of the development was to develop each perspective in order to provide the practitioner with some narrative to guide the considerations and hopefully stimulate insight, discussion and finally decisions as suggested by O'Brien (1995).

Earlier in the section the components of alignment (I-XI) contained within Tables 6-7 to 6-17 were categorised with normalised narratives and these were added to the current assessment perspectives in line with the conclusions drawn from the analysis. As expected this is not a

linear one for one allocation with some factors being relevant to more than one perspective. By cross referencing the alignment detailed components (1-38) contained within Tables 6-6 to 6-17 it was then possible to map these elements into the existing perspective structure. In addition, the narrative was added to explain the main elements for consideration in alignment. The resulting table was then developed to the format in Appendix N (Table N-1). The next iteration was to normalise the components within the table and remove the source column which was not required (Appendix O, Table O-1). Finally, the enabler and inhibitor components drawn from the SIM survey and the case study were added to each segment in a similar cross mapping exercise. The final iteration which outlines the perspectives to be considered, the components within each perspective and the key enablers and inhibitors' to be especially aware of when creating CSF's is outlined in Table 6-19.

Table 6-19 Mapping the Alignment Components to the PSSAM Perspective – Final Iteration

Perspective	Aspect	Narrative	Enablers and Inhibitors
Financial Perspective			
	Service scope(1)	Performance targets = influencing efficiency and effectiveness	SIM Survey (53) Business units competing for IT resources rather than sharing
	Processes(4)	Identify direct and indirect benefits	
	IT Governance (9)	Financial Thresholds Governance Structure Documentation complexity and robustness Risk management	Case Study (67-70, 80) Three E's: economy, effectiveness, efficiency Governance and assurance requirements,

	Long Term View (25)	Constancy of purpose	resource prioritisation Freedom to act – light governance to promote empowerment Financial instruments (SO's, SFI's, Procurement rules) Acceptance of risk balanced with innovation
Perspective	**Aspect**	**Narrative**	**Enablers and Inhibitors**
Stakeholder / Customer Perspective			
	Service Scope(1)	Expectations of citizen and stakeholder – including effect of social trends (e.g. access via mobile device)	SIM Survey Enablers being: Senior executive support for IT IT understands the firm's business environment Close partnership between IT and business IT and business personnel have close personal relationships Inhibitors being: Lack of senior executive support for IT Business units' lack of support for corporate-wide IT initiatives
	Service Governance (3)	Delivery point of service to meet stakeholder interactions Stakeholder identification Governmental and European Regulations	
	Distinctive Competencies and Constraints (2)	Standards of Service, responses to new initiatives	
	Organisational Structure and Responsibilities (4)	Required transitions of organisational boundaries	
	Processes (5)	Amount of acceptable customer interaction in	

		process	Resistance from senior executives Case Study (55,56) Understand future plans, actions and expectations of Welsh Government; devolved Health Boards; Executives and Non Officer Members of those Health Boards; and managers and staff delivering the service. Interactions from shared patient experiences
	Technology Scope (7)	Expectations of Suppliers	
	IT Governance (9)	Committee structures Organisational structure of control and management of project(s)	
	Customer Thinking (14)	Link internal processes to customer orientated thinking Attitude to customers most important	
	Specific Viewpoints (17)	Consider specific viewpoints [usability and access for stakeholders]	
	Long Term View (25)	Constancy of purpose Long term relationship with suppliers	
	Leadership (35)	Helping, integrate decisions into work, act on system, improve quality	
	Communicati on (37)	Purpose, two way	
	Outside in perspective (38)		

Perspective	**Aspect**	**Narrative**	**Enablers and Inhibitors**
Key Process Perspective			
	Service Scope (1)	Timely and state of art services to citizen and stakeholders	SIM Survey (44,46,47,54) Good communications

	Processes (5)	Identify Core Processes Clinically Flow, Value added opportunities, workflow improvements Balanced approach to benefits [between performance and operations) Agreed national or local processes employed	between the IT organization and the business IT organization meets commitments IT organization involved in business strategy development Business communication with IT
	Organisational Structure and Responsibilities (4)	Delivery of organisational boundary transitions	Case Study (57-59,61,63) Building relationships to understand business, plans, knowledge, constraints, partnership working
	Technology Scope (7)	Derived Information	
	Processes (11)	Practices and techniques used to request, develop, maintain applications and infrastructure Enablement links to organisational processes	High and multiple levels of communication Develop within a whole system context
	Information and Infrastructure (13)	business processes must link to IT processes	Developers use iterative process close to the prospective users using experienced business personnel to reduce issues through quality assurance, improve testing, and ultimately deliver benefits
	Customer Thinking (14)	Link internal processes to customer orientated thinking	
	Integrated Design (16)	Iterative design process – references vision, architecture	Run a well planned, timely development and ensure a quick transition
	Process Perspective of	Strategic, structure and operations perspective in	

	Design (18)	design	
	Interrelationship (30)	Interrelationship of systems, components, organisation	
	Continual Improvement (31)	Reduce variation, improve quality, reduce delays and defects	
	Leadership (35)	Helping, integrate decisions into work, act on system, improve quality	
	Design (36)	Design to support demand, value and flow	
Perspective	**Aspect**	**Narrative**	**Enablers and Inhibitors**
Learning and Growth			
Human Resource Capital			
	Distinctive Competencies and Constraints (2)	Capacity and Capability (competence)	SIM Survey (45) IT organization demonstrated strong leadership
	Skills (6)	Culture – will to succeed Leadership impact Range of education and life skills Match to requirements for customer interactions (see capacity capability)	Case Study (62,64-66,81) Create shared languages between developers and business personnel Leadership at vision, political, resource, technological, implementation and support dimensions Ownership of vision
	Core Competencies (15)	Core competencies – human resources	

	Constraints and opportunities (20)	Consider HR constraints and opportunities	supported by good relationships, freedom to act, empowerment, trust and professionalism
	Motivation (27)	Intrinsic motivation at all levels	Good knowledge base over business, its workflows and processes, improvement methodologies and analysis, role of technology in future High level of technical comprehension
	Training and Knowledge (33)	Vigorous programme of training, education and self-improvement	
	Leadership (35)	Helping, integrate decisions into work, act on system, improve quality	
	Communication (37)	Purpose, two way, reduce fear	
	Outside in perspective (38)		
Information Capital			
	Distinctive Competencies and Constraints (2)	Capacity and Capability (competence) Level of outsourcing (to promote flexibility)	SIM Survey (43) IT plans linked to business plans
	Organisational Structure and Responsibilities (4)	Capacity and capability to deliver transitions, mergers and consolidation of organisations	Case Study (60,64,71-75,82-83) Create workflows which are standard, have limited variation, and are linked to IT and information infrastructure Leadership responsibility rests for technical and support dimensions Maturity of the IT
	Technology Scope (7)	Important applications and technologies Bespoke departmental applications- links to equipment and devices Derived information Integration and workflow	

		requirements across organisation Capabilities (to inter act with stakeholders/citizens) Capabilities (to support internal customers/stakeholders) Capabilities of suppliers Capacity, capability, functionality, robustness of solutions	Department and the infrastructure Robustness and resilience of supported solutions Data quality of existing collection and presentation methods Maturity of integration between systems, message exchange Capacity and capability to introduce change Fit for purpose solutions is paramount to successful acceptance, deployment and continued use (fades to background test) Status of any supplier, ability to deliver over a long period of time in a consistent manner.
	Architecture (10)	Where on maturity scale being: Enterprise solution <–> multiple integrated solutions Important infrastructure approaches Bespoke departmental, links to equipment and devices Derived information Integration requirements across the organisation	
	Information and Infrastructure	Infrastructure architecture Strategic Integration - Link between IT strategy and IT Processes Functional integration – business strategy must link with IT strategy, business processes must link to IT processes	
	Integrated Design (16)	Iterative design process – references processes,	

		vision	
	Specific Viewpoints (17)	Consider relevant aspects (e.g. security)	
	Constraints and opportunities (20)	Consider technological constraints and opportunities	
	Interrelationship (30)	Interrelationship of systems, components, organisation	
Organisation-al Capital			
	Service Scope (1)	Geographical areas	SIM Survey (48) Clear ownership of IT-business alignment
	Service Governance (3)	Structures, oversight committees	Case Study (64) Responsibility at vision, design and development level
	Organisational Structure and Responsibilities (4)	Transition State of organisation, Boundary of service provision, professional or organisational autonomy, structure and responsibility of management tiers	
	IT Governance (9)	Management of ICT, conflicting or complementary responsibilities Delegated authority Organisational structure of control and management of project(s) Risk management	
	Constraints	Consider managerial	

	and opportunities (20)	constraints and opportunities	
	Interrelationship (30)	Interrelationship of systems, components, organisation	
	Communication (37)	Purpose, two way, reduce fear	

From a practitioner perspective all of these factors combine to support the interpretation of the internal perspectives both in their interdependency as well as their detailed interpretation including identification of critical success factors which will assist alignment. In addition to aid the reader the table is re-presented in Appendix O Table O- with the associated literature references.

6.5.6 Testing the PSSAM Characteristics

Earlier in the chapter Tables 6-4 and 6-5 identified aspects from the literature which were considered as part of the category of characteristics of any potential framework or conceptual model. Some of those identified were embedded within the differing perspectives e.g. constraints of human, technological or managerial issues. However, a number remain as attributes to be testing against any potential frame of reference or model created. These include: ability to measure pre and post improvements (processes (5)); capable of dealing with changes, not static alignment (adaptability (19)(34)); recognition that alignment is a process rather than an end state (dynamic process (21)); that an evidence base of use is available (evidence base (22)); should consider alignment at different levels, incorporating strategic and implementation perspectives (linkage (23)); attempt measurability, tie planning process down to each business units' critical success factors (measurability (24)(28)); embraces concept of an emergent approach to change (change (29)); link the improvements

in quality to efficiency, effectiveness (understand cause and effect (32)); and impact external demand on service (outside in perspective (38)). These factors had previously been mapped to methods and methodologies when assessing suitable approaches to develop revised frameworks and reference to Appendix M confirms that these aspects are containable within the MSP and particularly the BSC methodologies. As the PSSAM draws heavily upon these two approaches the validity of the proposal is confirmed.

6.5.7 Summary and Presentation of the PSSAM

The PSSAM has been created to consider the external environment, vision for the service, current and future position across four defined perspectives being: financial, stakeholder, key deliverable processes and human, technical and organisational assets. It is a normalised approach based upon methodologies widely available and which are used in practice with evidence bases. They retain the benefits that each selective approach brings to the field but benefit from the synthesis emanating from the research. In addition, it has been possible to bring critical factors from a national survey and a small longitudinal case study into the same format to aid the practitioner with knowledge based upon the wider professional responses and lessons from a successful alignment. It has been tested against criteria drawn from characteristics cited in the literature and proved to be remarkably inclusive due to the strengths of underlying methodologies. Further work is now required to test in the field in order for it to be considered as a useful source of reference to improve alignment of service and technology within a public sector environment.

6.6 Conclusion to the Analyses

Chapter two set the context that an opportunity existed to enable the public services in NHS Wales to achieve significant economies of scale and underpin service changes to accommodate the reducing financial envelope. One of the key transition factors was to

provide enhanced alignment of strategic business priorities with ICT requirements and to deliver them in a timely and quality assured manner. The sector has not utilized structured alignment methodologies in practice and therefore plans on any transition activities to achieve this strategic intent have not been visible or articulated. Thus in this section the emerging themes based upon the key findings and analyses are presented with concluding thoughts.

6.7 Emerging Themes

6.7.1 External Environment

Chapter two raised several areas for examination across the study ranging from statements on making effective use of technologies; what will be the effect of changing technologies; and the importance of monitoring external changes. From the literature, Hsiao and Ormerod (1998) refer to the turbulent environment requiring businesses to modify and extend traditional approach to change by transforming themselves into adaptive enterprises in order to confront and respond to increasing complexity and uncertainty. With the exception of Luftman et al. (1999) who argued that the external environment dimension was dealt with by scope; core competencies; and governance, there was limited reference or detail within the alignment literature about how to consider the wider environment. Whilst many contributors (Coakley et al., 1996, Ciborra, 1997, Gunn, 1997, Labovitz and Rosansky, 1997, Maes et al., 2000, Venkatraman, 2000) highlight the dynamic nature and the need for adaptable conceptual alignment models there appears to be limited appropriate examples for the practitioner. The case study provided further examples, a coincidence of desktop and server type technology being deployed, of how a disruptive technology (Phaal et al., 2004) can influence the direction and take up of such advances with its influence on preferred service access and performance. The case study reflected the conclusions that the approach would have to be technology based, would underpin the clinical processes and give patients more

choice over their attendance dates whilst providing the capability to deal with administrative overheads. In political terms such changes can be driven by the government (Digital Wales Advisory Network, 2012) as an ambition which can influence the use and deployment of services within a public sector context. This is compounded by the increasing influence of the governance of the service and the need to have transparency with the citizen. Due regard to the economic backcloth was also essential in that the preferred solutions designed would need to be moderated to the size of the public resource limits, and be subject to prioritisation criteria or the constraints of available funds. The context in chapter two outlined how IHC set out with a strategy to partner with the external sector (which it could control) but ended with, due to resource limitations, a partnership with existing NHS Wales development resources (with which it could only negotiate). The case study solution was spared the more brutal reality of the current and forecast financial environment being able to pursue their vision utilising resources within their own department. The changes in technology has also seen a movement away from the ICT department being the primary application developer becoming supplanted by end-user development using new, sophisticated application tools (Luftman et al., 1999). Such a trend is likely to continue with the more widespread access to 'Apps' (Applications) based around the many variations of available mobile devices, operating systems and cloud storage services of data. This is likely to increase the consideration for use of third parties within any solution design but that approach itself can be influenced by the political views around more all Wales approaches or effects of market economies on supplier developments particularly within, and emanating from, England. In service terms, the other UK countries can have an influence upon Wales as processes are standardised within solutions by suppliers which, as in the case study, had entered almost a monopolistic state making it difficult to develop solely for a Welsh context. Discrete national policies can therefore affect and accelerate a potential dichotomy between agreed national strategy with

external developing technology and the necessity of negotiating with suppliers. This continual interaction and link to horizon scanning outside of the sector will enable practitioners to consider opportunities that new technology and equipment may initiate or have early warning of obsolescence. The case study highlighted the impending changes to a 'normal' way of working, potential impact of technology to suppliers, new ways of providing and fitting of appliances (digital hearing aids), interlinking of equipment (HIMSA) and changing social and service expectations which were simultaneously about to enter into a period of transition. Such a conclusion would have been identified by an external environmental review. Visions and more importantly strategies need to be achieved in a timely fashion or at least staged to re-alignment points ready for review as a result of a changing environment. Quick transformations mitigate the effects of external changes impacting on the design, development, deployment and on-going use of a solution as demonstrated by the case study. Whilst some of the conceptual models have some rigour around an internal perspective they must embrace the external perspective at the initial stage and then iteratively consider the future. Therefore, the study confirmed that aspects of the external environment whether social, political, technical or economic require scanning as part of a continuing cycle of work for alignment and will remain important reconnaissance for any vision or strategy under development or review.

6.7.2 Vision

The vision in Wales was published in the form of a five-year Service, Workforce and Financial Strategic Framework for NHS Wales and recognised that forecasting and controlling future demand and resources was not possible. Sharing and adoption of the vision would be promoted by integrated thinking and working across NHS Wales and close collaboration with partners (Welsh Assembly Government, 2010). The importance of a vision has been well documented within the literature as a desired future state or the aspiration of

the organisation (Johnson et al., 2008). Without this clarity, it becomes increasingly difficult to consider the direction and scope of an organisation over the long term, which achieves advantage in a changing environment (see previous section) through its configuration of resources and competences with the aim of fulfilling stakeholders (Johnson et al., 2008). In the case study, the vision was articulated and led by the CAS who set out long term objectives which were then jointly constructed with the supplier. It was evident early in the case study that leadership was a key success factor in the alignment vision within audiology and his role in consensus building was maintained throughout the transition. This demonstrated very clearly that both the department (combination of effective services with an element of patient activity recording) and the supplier (the development of an electronic record to support services) had a common vision within which all aspects of the solution were determined. The conclusion from the study confirms that the vision was very clear to the parties involved in the delivery and suggests that there is an association of alignment achievement with involvement in its inception, design and delivery to ensure vision achievement. This is several step changes from transforming NHS Wales based around a set of frameworks which only indicate methods of transformation communicated in a manner which itself is a command and control (Seddon, 2005) or central directed approach. The literature supported the importance of a vision but the case study, although clearly focused on one vision, was of a different scale to that instigated within the wider NHS Wales. The case study did show the value of starting in one area (Deming would suggest system) and gradually extending its boundary (from department to all Wales) to deliver additional benefits which suggests by embracing the new behaviours nationally the whole system could eventually be changed in line with AQF principles. What was not recognised was the imperative to achieve these very promptly thereby delivering benefits which would address the financial restrictions.

6.7.3 Strategic Objectives

The WG (Welsh Assembly Government, 2003) indicated that modernisation and ICT programs in health care have not been well integrated and they must be closely aligned both strategically and in practice. The extant literature also suggests that IT Alignment Planning has since emerged as a necessary task of many senior managers (Peak et al., 2005) and is a key concern (Avison et al., 2004) yet the current approach has been disrupted through a series of delays and delivery of reduced functionality suggesting this level of importance has been subjugated lower than other delivery objectives. At a time when England was moving towards an approach of supporting local solutions within a framework of national standards and outcome orientated clinical capabilities the need for a possible reconsideration over the strategic approach for ICT in NHS Wales has been highlighted.

Referencing the literature indicates the approach usually undertaken was to break down a vision into strategic objectives and historically this has meant strategy formulation with 'IT-enabled' strategic change achieved through formal top down planning although this has been criticised in the literature as inadequate because of its static and linear nature and that one size does not fit all (Ciborra, 1997, Brown and Magill, 1998). This symptom was identified within the research context when considering the national programme. The initial interaction of audiology with suppliers was not based on any formal strategy at a local or national level but was largely driven by opportunistic enquiries and networking within the profession having identified a clear link between the required service change and the underlying benefits of using an electronic IS. This required stimulation to start a period of change in the audiology environment and introduced into this research the importance of innovation as a factor to be considered in future alignment.

Additionally, with the National ICT strategy in place, recognition of strategic planning shortfall, which could drive changes to published approaches, plans and developments by the

national programme produced limited amendments. Over this longer timescale issues had been created over convergence of the department systems as well as the wider hospital IS. The change can best be described as a movement from the planned interfacing strategy to avoid 'rip and replace' to one resembling a collection of small enterprise solutions.

Within England the audiology modernisation programme, which set out to leverage the patient benefits brought about by the provision, issue and support of digital hearing aids, had issued a funded strategy to address digital hearing aids and as a result halted overnight potential supplier selling opportunities. Thus, the mere announcement that national funding of strategy components, which is noted as a factor in its success, had a progress limiting effect upon the supplier as decisions to proceed with procurements within hospitals were halted whilst departments awaited the details of how the national resource would be made available before any commencement of modernisation. In this case, from a supplier perspective, a two year hiatus was introduced into their business development and cash flow. However once clarification of the resources emerged and were made available, the progress was rapid with national procurements being co-ordinated and successfully securing a supplier who was now under pressure to develop and deliver following the 'lean' period. This then created a similar effect within Wales and suggests that national strategies, whilst being supportive through focussed funding, have an ability to create significant stop-go waves in the innovation and product cycles. Risks to the supplier whether it is intended or otherwise does not significantly feature in any strategic planning and would have been more profound in the current and future environment as the shelf life of a product reduces annually. The case study identified that the product which optimally fitted the requirements was nearly withdrawn from the market due to the company not being able to sustain its business. The importance of appropriate research into the supplier base as part of strategy formulation was highlighted by these events. There remains an assumption that where national programmes

are in place they have strategically been joined up as part of their formulation and that the business is aligned with limitations of technology whilst the business requirements have been planned into the ICT delivery aims. As a result of national initiatives the local organisational alignment thinking begins to wane. As the strategic implementation progresses further the position, as in NHS Wales, lead to solutions which were divorced from local context, changing environment and strategies with the resulting development having one size and therefore 'having' to fit all.

A key benefit of having an aligned strategy was demonstrated by MASW which adopted key attributes for alignment at a national level by linking together the objectives for the service, training, appliance improvements, underlying technology and IS. Based upon the participants responses in the case study there does seem some evidence that the setting of a cohesive approach embracing a number of objectives can assist a service modernisation objective and is similar to approaches used in system thinking through the whole process. This is contrasted with the approach to national alignment between business and technology within Wales which seemed to become disconnected over time suggesting regular, annual, reviews of visions, strategies with consideration of these key attributes would bring benefits by highlighting required adjustments to a strategy. One clear question therefore emerged during the study over who has the alignment responsibility. This is most likely where that alignment vision, discussion, analysis and decisions takes place described within this study as a pivot point for alignment, and it was evident activity around the CAS. This was less clear when considering current NHS Wales alignment.

Once the strategy implementation was underway alignment of the solution with business needs, demonstrated within the case study, requires review as new requirements bringing changes as a result of changing governmental priorities. The study demonstrated a preponderance to add to the existing solution usually in seemingly impossible timeframes

with limited visibility of impending change being available to the supplier. However, some of these changes are driven by the publication of other national strategies e.g. Performance (RTT) which challenged the primary solution which was based around improving the patient, clinician and administrative flow. This questions whether the absence of other strategies at the audiology's solutions inception was more of an enabler in that the design was focussed solely upon the central clinical process design and producing benefits to patient, clinician and administrative staff rather than performance information for central reporting. In contrast the national programme in Wales also focussed away from the performance management agenda yet still came up against challenges to be successfully adopted. As more layers of national reporting were added to the audiology solution it appeared that less consideration was given to the basic underlying process, its maturity and its effectiveness. This suggests that a continuing alignment process around every solution needs to be in place over an extended time and not just at its inception utilising the principles of PDSA. Future announcements within a strategy framework in Wales would therefore benefit from a similar process of alignment analysis undertaken before mandating to the service. Such an analysis would aid an understanding of where the last strategy had driven the service and make the linkages around pre-existing shortfalls in supplier capacity and capability, solution design to inform future service announcements which should assist with stakeholder expectations. A ST approach focuses on the requirements of the system rather than the required performance information of that system which puts the performance regime of RTT at odds with a ST approach suggested by the CEO NHS Wales. NHS Wales would do well to heed their own advice (Welsh Office, 1999) of ensuring secondary information is a by-product of the operational process.

Being an early adopter of technology in audiology, particularly in the design and subsequently the test environment, brought about a competence of how a public health

clinical system would need to work, thereby making the vision of local audiology services underpinned by technology a reality. The literature is well covered in the area of technology first movers (Sabre, Amazon) and the audiology solution has similarities by becoming the dominant solution in the market place. This took place in an environment where the department was able to influence (an important factor) the alignment of the solution with the business needs and contrasts with the national ICT programme which had tried to replicate existing solutions but in a 'Once for Wales' context. Thus, local innovation, particularly in early stages of research and development, can be derived from opportunistic events and the imposition of 'one way only' strategy can limit opportunities and stifle progress. This is in stark contrast to the more traditional approach of the national programme which although maintaining an engagement dialogue centralised the design and decisions around solutions. The audiology solution brought outside suppliers into an environment where the knowledge from those working within the service could apply their expertise in unique ways and demonstrated the value of joint partnership working between commercial and public parties which has continued over time and shaped the future direction of the product. Within Wales the national approach to external partners was deemed to be too expensive thereby limiting the capacity of the programme as well as reducing outside in expertise and innovation. Subsequently, this has changed as more and more components are sourced from the market place. The national approach to local expertise is also at odds when compared to the case study which, as previously indicated, has been designed from the centre.

However this must be tempered by the longer term effect on the market place demonstrated by the creation of a dominant audiology IS supplier who is close to establishing a monopolistic situation and this could be replicated by only centralising all ICT design, development and support within the Welsh Public Sector. The audiology solution was built around a vision which was linked partially to academic literature on electronic records which

gives a partial support and recognition to the value of evidence supporting strategies. The work was undertaken to achieve the vision with the benefits only really apparent after the development and implementation and was linked to the credibility of the CAS with the approach demonstrating the value of service knowledge linked with a technical competence to produce practical solutions rather than a sterile technical utopia. This creates a dilemma when, in the current environment, justification of benefits have to be made in advance of the investment. One approach to mitigate this is the use of pilots like that undertaken in audiology.

The PSSAM diagrammatically laid out the interactions between the vision and the external environment with the need to link to strategies based upon evidence. Kaplan and Norton (1996) highlighted the importance of considering all perspectives and actions through such a structured approach, with careful measurement and thereby management of actions (if you can't measure it then you can't manage it). The case study confirms the importance of strategically setting out to align not only components of practice but also the parallel strategies issued by WG. The modernisation and ICT are still not well integrated at either a strategic or practical level and in the absence of aligning to a common shared vision, supported by an acknowledgement of the additional work required to reduce variation and understanding local context constraints, then NHS Wales will not replicate some of the beneficial outcomes outlined within the study. The position produces a contrast between the predicament that national ICT Wales finds itself with the outcomes of the case study which produced similar success factors to those published in the English announcements that local organisations and partnerships are best placed to make key investment decisions that add capability in IT in line with local context, operational and strategic imperatives.

6.7.4 Informatics issues and tensions within the public sector in Wales

The study drew attention to a number of factors and tensions which remain unique to the public sector and this analysis focuses on what has emerged particularly in NHS Wales. In general terms by contrast to other alignment literature, the parameters of customer, supplier and shareholder are not applicable with terms like stakeholder being more relevant. There are multiple relationships which all have significant interactions: patient and department; department and local management; local management and WG; department individuals and scientific advisory group; department and supplier(s). These are not the obvious contract or pecuniary flows with citizens receiving a service provided by an organisation which is paid by the government from taxes raised by national government. A complex set of tensions arise due to the need to identify and justify benefits to the identified stakeholders, including at the point of delivery where the service is often produced and delivered by a single group of people at a local level, with the expectations at government levels which may be based around financial, efficiency, service levels or politically committed statements. The local level experiences a level of uncertainty that this brings in citizen interactions, which will influence the delivery of what information is required to these decision points. Where information flows became more uncertain then more skilled employees are needed to interpret information from citizens in order to disseminate it properly through the information process. Ideally it would be desirable to align all the components within the service provision (system) and also within the wider organisation which formed the boundary. However, this is compounded by the increasing influence through the governance of the service and the need to have transparency with the citizen leading to governmental guarantees over service levels becoming more prominent in the design and improvements less about what citizens (customer) thought mattered and more what has been targeted by national government policy.

At a higher level, changes can be driven by the government which can influence the use and deployment of information services such as: separate commissioning arrangements merged to a single organisation; independently managed organisations (Trusts) to one composite local health board; or discrete public sector service areas to wider integrated public service approaches. All of these have profound implications which in the majority of cases bring impacts upon the information services well after any announcement. Such factors include: organisational infrastructure changes and therefore its processes, flows of information and responsibilities changing with each transition; consolidation of processes with the enabling technology; and a delay effect in investment making the implementation of new solutions or consolidation of existing systems lag behind the organisational service changes. In other cases, the changes are limited to particular strategies and can therefore affect and accelerate a potential dichotomy between available technologies or in the worst case directly oppose those aspects contained within other issued strategies e.g. ST approach focuses on the requirements of the system rather than the required performance information of that system which puts the performance regime of RTT at odds with a ST approach.

The workforce which has worked across historic boundaries within the hospital and in the community find themselves with far less autonomy having to fit within a hierarchical structure both organisationally and professionally. This can make the analysis of informatics requirements difficult to identify and with increasingly tight governance, impacting upon the level of empowerment and decision making, limits innovation and the level of motivation to produce solutions which are adaptable, reduce variation; improve the processes, flow and the system overall. To establish any improvement now requires levels of supporting document requirements (business case) that are of increasing complexity and Kafkaesque in nature with a focus upon risk identification and removal of risk taking, another opposite aspect to further innovation. When submitted any investment it sits within a competing set of priorities which,

if fortunate to be supported, inevitably in a resource constrained environment, receives less than adequate funding leading to functionally mediocre or sub optimal solutions.

Within the health sector in Wales tighter control over informatics strategy convergence has been put in place through the establishment of the national program which is reinforced by tight oversight and has the effect of stifling innovation or reducing the ability to make small steps of progress. This has led to local organisational alignment thinking beginning to wane with consequential reduction in support for alternative investment strategies around ICT. At a department level requirements for solutions based upon specialty specific requirements are potential candidates for fragmentation away from a corporate style of 'one size fits all' approach to applications advocated by the national programme. Increased austerity has so far limited this direction of travel.

To conclude this part of analysis it is possible to identify tensions in the relationships between: between IT and business personnel; IT plans links to business plans; business is aligned with limitations of technology; business requirements have been planned into the ICT delivery aims; other UK countries and their influence upon Wales; and the directives from the national programme with local imperatives to provide benefits to the clinicians. All of these aspects require consideration at differing points of any transformation, decision and ultimately alignment.

6.7.5 Stakeholder Perspective

The WG published a need to have close collaboration (Welsh Assembly Government, 2010), see a transformation of people's lives and work in true partnership with partner organisations and staff. It went further by promoting the importance of clinical engagement particularly around processes and behaviours. This prompted the questions over whether partnerships work, how collaborations have fared in the past, and who are the key stakeholders. The

academic literature identified the customer as the centre of focus for the business but as indicated earlier the public sector has a multiplicity of interactions which does not give a clear hierarchal view of the supplier and customer relationship therefore the PSSAM suggests that the more embracing term of stakeholders should be used. O'Connell (2007) outlines a key part of any project outcome is to identify what each stakeholder has as their preferred outcome (win conditions) in order to assess and consider the likelihood of success. This concept was demonstrated in the networking that the CAS undertook via establishing good working relationships throughout all levels of the NHS system particularly into the WG and the political arena with proposals needing to be tested out with and welcomed by fellow professionals in that area. This approach is similarly required in the future but the danger as the number of stakeholders gets larger is how to accommodate these changes. To mitigate this in the case study scenario the CAS maintained an established network ensuring recognition, professional credibility and an ability to act politically with a large number of influential stakeholders at local and national level which support the ability to make judgements on alignment decisions. The key factor was the ability to influence with the study again highlighting the importance of a pivot point for these decisions. The case study had a limited number of stakeholders at its inception and the interaction between the CAS, the supplier and the department staff ensured an effective understanding of each other's perspective. This was an iterative process rather than a static one, continued over a long period of time with these requirements not being written down in a formal sense although they did still exist and were a common understanding within the team and for the future (P3). This long term view is consistent with the thoughts of Deming (1986, 1993) over having a long term relationship based on the quality of product. To achieve this, the supplier had to keenly listen to the service demands and respond accordingly. Interestingly, the level of contractual relationship was very informal during the development work stage where either

party could have walked away from the work. The supplier was important to the department bringing an expertise to the department whilst correspondingly the department brought knowledge and expertise to the supplier over how the service and clinical process would operate. The importance of this mutuality underpinning relationships requires further work. This was all driven by a clear vision of requirements from the CAS. There was a high expectation that the solution would become business as usual when implemented and all parties worked hard to achieve this in an iterative manner. This suggests that stakeholder requirements can be aligned at a vision level but must be treated in an iterative manner as the work progresses towards achievement. The responses of participants highlighted the importance of consensus building across all stakeholders throughout the strategy and solution development. As Deming (1993) posited, the greater the interdependence between components, the greater will be the need for communication and cooperation between them. The one group of stakeholders who weren't actively involved in this consensus though were patients. They remained largely a beneficiary of an improved service and enhanced appliance although their articulation of this requirement was not highlighted within the study. NHS Wales encourages the involvement of patients in the planning and comments on its services and would go some way to identifying demand, particularly failure demand (Seddon and O'Donovan, 2010b) within any NHS study. The case study revealed that as governmental guarantees over service levels became more prominent the design and improvements became less about what patients (customer) thought mattered and more what has been targeted by national government policy. The research did not review the impact what patients have made of the provision of services, where involved, and further work into the position and focus of patients' views with the use of ST should be considered. An absence of such approaches in the future may result in missing opportunities to plan more co-production opportunities with patients (Skaggs and Huffman, 2003).

The SIM surveys, amplified by the case study, reported the need for close relationships at a personal, business, professional and stakeholder level and as such communication of relevant information remains a key requirement in the alignment processes. This extends far beyond the early inception of vision and ideas but throughout the whole cycle into on-going use and improvement of the solution. In a national context this would identify the need for close alignment through dialogue between the service requirements for the future, the ICT architectural planners and the wider professional and stakeholder groupings culminating in joint planning approaches around demand similar to those suggested through ST.

The study concluded that identifying the stakeholders and communicating with them was a key task, needs to take place over an extended period of time and is iterative. The CAS demonstrated the benefits of true consensus building through national groups, links with local departmental staff and with fellow professionals to deliver national investment and standardisation of approaches with appliance and system suppliers.

6.7.6 Financial Perspective

The financial pressures mounting upon the Welsh NHS was clearly identified within chapter two with the resolution being presented via service transformation and economies of scale in back of house technology services. More locally, this pressure to reduce expenditure was persuasive in deploying national solutions and obtaining a more cost effective standardised approach under a joint national and local governance framework. National strategies have not published any impact assessment or financial projections of the cost to achieve these desired outcomes.

A financial perspective is also conspicuously absent from most of the alignment literature, no top level enabler or inhibitor in the SIM survey overtly highlighted financial perspectives as a significant factor to be considered, or in a number of practical models and methodologies

with cases being judged on the basis of return on investment within the business environment. In the case study the investment was exposed to a limited assessment of benefits identification or the rigour of a business case process. This was part of the lighter layers of governance, limited to obtaining early buy in from significant stakeholders at the time and subsequently the approval to turn it into a robust implemented solution through an income generation idea although this in hindsight seemed largely a flag of convenience which could have easily been translated to other upcoming action plans such as quality, or health and safety. However the partnership approach brought long standing financial benefits to the department through access to licences and functionality far beyond the more regular commercial arrangements. This is not consistent with more current approaches where the public sector goes beyond the normal investment criteria associated with commercial companies into demonstrating publically value for money through the principles of the three E's (Otrusinova and Pastuszkova, 2012). Future alignment possibilities will need to be aware of the assurance requirements enforced through the governance arrangements put in place and the likely 'competition' for resources being another constraining factor for potential projects. The case study also followed the need to comply with the organisations rules around procurement as embodied within Standing Orders (SO) and Standing Financial Instructions (SFI) which at that time were interpreted with more flexibility around procurements and supplier engagement. All of these factors in the more modern context will impact upon alignment decisions and would suggest each financial alignment decision should be taken closer to the process and under governance in close proximity to the service requiring support rather than remote governance committees who have to rely on reports and prioritisation criteria. The vision in NHS England announced in July 2013 (NHS England, 2013) indicated that local organisations and partnerships are most effectively placed to make key investment

decisions that add capability in IT in line with local context, operational and strategic imperatives and this again concurs with the case study.

As demonstrated in the case study in Chapter 5.5.1, lighter business governance can encourage more risk taking which can also facilitate innovation. This is in contrast with financial environments which are constrained and therefore require more prioritisation and strict investment criteria. Recent examples in the field suggest that strategic intent and innovation have been thwarted by the need to reduce costs and is a trend which will require further research in the future as the consequences become apparent.

There was evidence that the case study being a first mover in alignment had an unexpected beneficial impact. In a climate of increasing responsibility for resources, which was beginning to permeate into the clinical operations and management, a need for evidence was created. By implementing an aligned approach the audiology service became more effectively placed over other departments to support and evidence resource bids and demonstrated the enhanced quality service provision. The hospital management even supported a reuse of money generated to be used in support to the audiology service.

Finally, the impact of risks need consideration. The major risks in the audiology development stage rested with the supplier as it worked with the initial department to design and put together a coherent response to the requirements although they retained the potential intellectual property benefits. This contrasts with the change of approach nationally within ICT which saw that development risk transfer to the in house staff within the NHS. Concluding therefore, centralisation can appear to bring savings in direct cash terms but whether it is economically effective having additional risks, sub-optimal systems and processes, reduced forward capability whilst constraining innovation within such an

environment suggests further work on this approach at a time of constraints to staff and resources is urgently required.

6.7.7 Deliverables and Processes

Headline statements presented in chapter two from the then Health and Social Services - Chief Executive outlined a different approach was to be taken by reducing the command and control and centrally driven targets with more freedom for staff to innovate and improve services. This was expanded by references to system thinking and the need to reduce harm, waste and variation. The study areas of enquiry were extended to consider methods of system and service transformation in order to examine the appropriateness and constraints around alignment using these approaches. In addition, more evidence was required around how to deploy and use these toolsets or methodologies in a practical environment.

In order to deliver the objectives for the audiology service the department (with the supplier) had to excel at a number of key processes and exhibit characteristics which are more in keeping with the agile environment exhibited in current approaches. It also demonstrated a number of attributes which were consistent with taking a whole system view linked to the vision as outlined by the CAS.

The CAS initially wanted the solution linked back to his vision, the hospital information, and to achieve an open architecture between the PAS and audiology (P5). This was based around intuition and a professional view of what was required without any documented consideration of any methodology or framework in a manner which may have been described as a bottom up approach yet because of the CAS's national position encompassed a top down assurance i.e. a mixed approach. In addition, no participant could recount that such an approach involved the use of what can be described as new approaches or philosophy such as lean, theory of constraints or systems thinking. This was another example of the CAS's position

being critical in the alignment process but also highlights that models and methodologies have less value where the pivot point of alignment rests with individuals who have the necessary knowledge, experience and authority to coalesce the vision. This is supported in recently published in NHS England (2013) there was recognition of the criticality of having clinicians at the heart of the decision making and implementation process to drive forward introduction and use of integrated digital care records.

The statements from the CEO NHS Wales highlighted variation as an issue to resolve and this was exemplified initially by the supplier who had previously experienced the challenges of alternative development paths for different clients and had to suspend functionality changes to address and standardise the underlying code to ensure that on-going support was achievable. The initial work of the supplier in this case study was deconstructed and re-presented by the nominated solution architect to identify how the department worked and fitted to the underlying clinical and administrative processes with a close professional view being on making it fit for purpose at a national perspective. This had the benefits of reduced variation but embraced the key aspect to create a one size would fit all but allow some local variation. This required, and achieved, a consensus at a national level in Wales over key audiological processes and has been difficult to achieve within the national strategy with so many different pathways within the NHS.

The work between the department and supplier was iterative, took place literally within the department and aligned directly the deconstructed process with the reconstructed functionality. The local users had a high influence over the appearance and flow of the solution, challenging areas where they felt it moved from their working practice, towards a more supportive approach. It did, by future proof designing, simplify the process from a paper based one, reduce variation by providing one way to work through the system, and has seen improved services over time developed in small iterations rather than deep analytical

studies. This all highlights the value of suppliers working iteratively with practitioners around their processes to provide an enabled consistent workflow with limited paper as they create movement towards the articulated vision. Such process improvement has been exemplified in the literature through BPR initiatives such as Ford Motors (Hammer and Champy, 1993). This work at a local process level is in sharp contrast to national approaches which potentially have reduced variation but have demonstrated to date low acceptance by clinicians of deployed national products designed remotely from their place of work and way of working.

Despite the lack of detailed sets of requirements and formal documentation the benefits from using the system was experienced by many different stakeholders with improvements emerging at many levels in the process, work flow and information provision and all participants in the case study were unanimous in giving evidence of significant improvement to the clinical pathway which met their operational processes. This would support the recent national moves to working with suppliers in a competitive dialogue approach to more effectively understand the solutions limitations and stakeholders requirements without the complexity of requirements production and challenge of whether particular features work or even exist. The case study extended this concept beyond procurement limits into the design and development phases. This suggests that further work remains over how the dialogue phase can be routinely extended into the design and development stages using the iterative nature of this approach whilst not being compromised by contractual rigour.

The local department provided the detailed understanding of the clinical processes which enabled the supplier to respond within an iterative process similar to a PDCA cycle. This approach allowed the staff to be fully involved in the design and creation of the solution by giving time, having authority and recognition to their achievements. Over time, due to staff turnover, a variation has emerged amongst users who now exhibit differing levels of

knowledge about what the system can do, how they optimise its use or bring out additional benefits. This would suggest that the initial PDCA cycle, a valuable discipline, no longer functions on a systematic basis and further work to improve and maintain this aspect of alignment over longer periods of time should be undertaken in response to the changing external impacts.

Emanating from this joint work is the process to create the required technology centred around the flow of processes for the future way of working, supported by iterative development closely involving prospective users but guided by leadership of the solution owner, the CAS in the case study. The intentions (of the system) were clearly identified and there were examples of management interventions to ensure the interdependencies worked and barriers were removed. This was communicated to all involved, who were totally behind the aims and goals, and was further evidence of the importance that leadership had made to the success of the design, development and deployment of the audiology IS.

As indicated earlier the process was the basis for the design and here there was perhaps one area where some divergence from current practice occurred in that the deeper consideration of information requirements (detailed minimum data sets) was subservient initially to the workflow i.e. more focus on a ST approach than required data although this became a by-product of the operational process.

The use of third parties to provide the development in this case a small supplier who offered expertise and a collaborative working approach to the solution demonstrated the value of dealing with the dynamic nature of development supporting a tight, quick projects outcome. It supports the view that, in particular, more bespoke departmental solutions would benefit from a strategy whereby product selection, and development, is made at the nearest level to the clinical process it is planning to support and by those who will operate it day-to-day a

point reflected recently in England (NHS England, 2013) as opposed to the earlier strategic portfolio planning (e.g. Earl, 1988).

The case study did demonstrate that some of the principles contained within a ST approach were present although not visible to the participants with process design having benefited from a close alignment with the technology within a defined boundary of that system. As indicated earlier once that boundary is moved e.g. provision of community audiology clinics, the interdependencies change and such uncertainty requires additional communications and management. This relationship outlined needs to be more widely understood when considering over time the success or otherwise of ST from a national perspective.

Finally, the study did not demonstrate any widespread use of programme or project methodologies but it was acknowledged that the scope was small, the leadership experienced and there risks were known and managed. This highlights the benefits for project managers currently, who may not be familiar with the environment they are project managing, to spend time understanding the business prior to the project commencement or to be drawn from the business area themselves. Further work on the risks and benefits of programme and project management within NHS Wales requires further work although recent publications suggest that projects can be profiled in plans to delivering short term (maximum six months) modular components with associated step improvements (NHS England, 2013) a point to which the national ICT programme in Wales still aspires.

6.7.8 Intangible Assets

The national programme initially funded a number of readiness activities prior to the corporate solutions being available which due to the delays reduced their benefit as they were not aligned to the deployment. A focus on the intangible assets of an organisation prepares the way for future transformations which is described by Kaplan and Norton (1996) as

readiness. In more recent times, projects and programmes have identified states of readiness within their structured approach and have become identified as key transitional activities. Within the case study, limited preparation was mounted before implementation, issues being resolved as they occurred undertaken as a flexible response to deployment. In the current electronic era, this aspect of the case study, preparing to move from predominantly paper based approaches to enabled electronic pathways, may render the comparison to current methods as limited. Although different eras the importance of readiness were then and remain now key activities within project planning and NHS England (2013) recently drew attention to research which had demonstrated that systematic commitment to any model of continuous improvement in combination with rigorous but proportionate project management can deliver successful change management. This would suggest that readiness activities remain an important part of alignment.

6.7.8.1 Human Resource Capital

An expectation of the national framework was to invest in staff through training and development to enable an environment to promote integrated thinking in order for them to make decisions, improve their performance and generate learning (Welsh Assembly Government, 2010). The link between these factors is covered in other literature and was not challenged within this study however in considering the staff in the audiology service it was apparent that previous work over several years had led the department to have: collectively a significantly wide range of key core skills; an ability to consider new ways of working; and to be motivated to succeed resulting in greater participation and willingness to embed the change into their way of working early in its transition. The enthusiasm was built around a confidence, encouraged and supported, built upon an extensive base of knowledge, skills and both work and life experiences. This suggests that cohesive alignment can be enhanced by having a closer knit team established well before any projects are put in place. The

participants were proud of what they had done and achieved and demonstrated a value of individuals doing and learning rather than just implementing someone else's solution, a significant challenge when implementing the national programme deliverables. However, the study did identify that, as people move onto other roles, continual knowledge transfer is required after the transition and as functionality develops. Another feature of the study was a lack of recorded evidence on the journey, its key features or lessons learnt. This is not a unique feature but further work to encourage the recording of the reflections gleaned in a format to be placed into the evidence base and to encourage professionals to access such knowledge should be stipulated as a mandatory not optional activity. The features from the study was that training, development of skills need to take place in advance of any significant project and can take several years to produce a critical mass. The impact of other streams within the national framework has not been clearly understood as the implicit motivation has been curtailed through the consequences of the changes to organisations and competition for jobs. However, the case study did demonstrate that where it is in place it positively influences activities within the service to provide significant performance improvements and innovation.

6.7.8.2 Information Capital

England has taken the view that core architectural principles and information standards should be universally adopted regardless of the alternative roadmaps different care communities follow (NHS England, 2013). Their view is towards supporting local solutions within a framework of national standards and outcome orientated clinical capabilities. This is set against the NHS Wales approach to provide tools, systems and the environment to work safely and effectively within common all Wales systems.

Considering the experiences of the case study and the PSSAM guidance a number of factors require consideration within Wales. Closer alignment is required between strategies, the SIM surveys outcomes demonstrates a lack of clarity and predictability of corporate goals and

directions, and the need for clearer roadmaps (Phaal et al., 2004, Phaal et al., 2006) and blueprints (Great Britain. Office of Government, 2007) for the future ICT state. The case study had avoided the failure to align with wider national strategies. This should mark the start of a dialogue with local and national ICT programmes as common solutions take time to deliver and don't immediately take into account the diversity of departmental solutions in place within NHS Wales. Part of the past difficulty was that the breadth of ambition of the national programme was wider than its capacity. This highlighted the need for detailed business and technical analysis to be undertaken regularly by the national programme, an iterative process, in order to assure alignment plans are current with not just the processes, workflow and information but also the constraints of the local infrastructure where there is a need to consider the important applications and technologies, bespoke applications and links to other equipment and devices. Previously specialised solutions like audiology were not supported or considered in the wider planning context. This common system approach has not been successful on a national basis where top down processes (Ohno, 1988) have not been aligned to local processes with variations also existing with other HB's. Jackson (2003) highlighted that long term sustainable change cannot be achieved on the basis of remote expert diagnosis by consultants and recommendations endorsed only by higher management concluding that participation at all levels was essential suggesting further work on the optimum approach to rectification and future resolutions is required in this area. Maturity of the IT department and the infrastructure will be another potential constraint to be explored to ascertain its capacity to deliver transitions, mergers and consolidations. The importance of assessing the current infrastructure and technology available is well covered in the literature and also supported in the more widely used methodologies and the SIM survey whilst identifying that IT meeting their commitments is an enabler does suggest that difficulties in this area exist and has been proved by the delays to the national programme as a result of

both IT parties. Wider aspects identified within the literature highlight the assessment of capabilities to interact with citizens, stakeholders and existing suppliers. Where suppliers are incumbent or a level of outsourcing has taken place the capacity and capability of their organisation to support changes need assessment having first considered the robustness and opportunities of their solutions. In the case study, like most fledgling companies the supplier was willing to please, do anything to assist the development, and tailor the product to the department's processes although there was a lack of knowledge over the audiology service. This latter risk was mitigated by the supplier actively encouraging communication with the audit base user group so remaining current in their knowledge on the NHS and the trends. In a larger organisation, this is unlikely to be similar and identified suppliers must be questioned over whether they have the right expertise, resources and whether it fits with their business plan. The position in the case study had led to a supplier who was in a near monopolistic position but was still focussed upon their niche market position in audiology. This may not the position with other suppliers although the dangers of a sole centrally co-ordinated provision of solutions based around a public sector agency may become a similar proposition. The obvious risk transfer, evident within the development cycle of the case study, is also not available when the public sector retains the responsibility suggesting that in future relationships a firm understanding over the national capacity and capability is established before commitment to a full alignment programme. Previous approaches initially had little impact upon the case study which had a product that was reliable, bug free and stable, described as good as any piece of software that the CAS had used. Part of this extended to the initial flexibility which had resulted in different code sets, user screens, interfaces, database and field variations to fit local requests. This had left the solutions being closely bound to the processes which as previously described were created with a professional input across the networked profession and resulted in difficulties of extracting data in a consistent way

making comparative work challenging when later changes in the system boundaries highlighted this variation. This would support the assertion from a national perspective that variation can be reduced through common all Wales solutions. Further attention is required to assess how national programmes could change their approach, reduce the retained risk and provide mitigation for functionality deficiencies and delivery timescale slippages.

6.7.8.3 Organisational Capital

Knowledge of service requirements and system boundaries will improve the links between the strategy and the underlying investment objectives resulting in benefits for such an approach. However, the public sector is prone to change whether at a political level (structural changes at a national level), local level (consolidation of organisations) and departmental level (service changes). In contrast with the private sector this can happen without the context of a driving factor such as improving shareholder value or ensuring the survival of the business. Reference was also made to failure of private or publically quoted companies to merge as a result of incompatible IT systems which recognises the necessary alignment barriers which need to be considered. Public sector organisations do not consider the technology when considering any type of restructure. There is no evidence as to why this is a particular feature and the case study highlighted the benefits of considering a wider boundary in information terms when creating the audiology solution. Even within the study some local small variations and fragmentation remained hidden until service changes in the form of location provision and horizontal convergence became priorities which troubled the departments as they strove to normalise their solution. It is important to note that such change groups must consist of those individuals who understand the business and the extent of the system boundaries and are near the point of alignment. Failure to build upon this knowledge of the service and the information infrastructure can increase the chances of slowing down

the development and implementation but as Deming (1993) warned where components of an enterprise are all optimised then the organisation will not be.

The aspect highlighted in this area is to raise the profile and importance of IT as a critical business enabler for politicians and planners (Wanless, 2002) when considering any aspect of structural change for failure to do so leaves organisations in technology and information silos with limited capacity and capability to address solutions (North Wales Trust, 2009). This can be compounded further when alignment decisions are played out at a national level where visibility will be limited and planners unaware of the consequences to their portfolio resulting in convergence becoming disjointed (Public Accounts Committee, 2009). Further work needs to be undertaken to more effectively consider alignment consequences and answers as a result of organisational changes.

6.7.9 Leadership and decision making

Two aspects of the recent report from England (NHS England, 2013) were highlighted as being critical for the future deployment of technology and encompassed the need for clinicians to be at the heart of decision making and implementation process coupled with IT leadership and informatics expertise. This had previously been highlighted in one of the cornerstones of the strategic frameworks in Wales where the importance of clinical engagement was mentioned although the exact nature of what that meant in practice was left open for interpretation. The case study also clearly highlighted that not only was a there a need for local decision making but this was evident at certain points within the project and had features which combined certain attributes around information, vision to be achieved, knowledge of service and technology. The academic basis supporting this view is based upon system thinking which was outlined in section 3.4.11. A systems approach focuses on the interrelationship between the various parts of the organisation (Deming, 1986, 1993); has an emphasis upon effectiveness not efficiency (Zokaei et al., 2010); supports an emergent

approach to change and is learnt by doing (Seddon and Caulkin, 2007); requires familiarity with customers (patients) and workers thereby promoting engagement (Seddon and Caulkin, 2007); cannot be achieved on the basis of remote diagnosis (Jackson, 2003); has an understanding of the whole picture including benefits (Checkland, 1990); and can differentiate between demand and failure demand (Seddon, 2003). Other literature supports the need to consider such decisions with Maes et al (2000) highlighting the need to consider the constraints and opportunities- human, technological, managerial – in the relevant business and technological context. Other writers have contributed to the factors which require consideration within any future decision framework (Parker et al., 1988, MacDonald, 1991, Niederman et al., 1991, Baets, 1992, Powell, 1992, Broadbent and Weill, 1993, Deming, 1993, Henderson and Venkatraman, 1993, Norden, 1993, Baets, 1996, Hillmer and Karney, 1997, Baets and Galliers, 1998, Hsiao and Ormerod, 1998, Papp, 1999, Maes et al., 2000, Rondinelli et al., 2001, Kaplan and Norton, 2004a, 2004b, 2004c, 2004d, 2004e, Peak et al., 2005, Seddon, 2005, Kaplan and Norton, 2008, Radnor and Walley, 2008, Zokaei et al., 2010).

The case study outlined that these system characteristics, and factors, were considered leading to decisions being made at specific points during the lifecycle which have been described as pivot points within the thesis. This based upon the definition by Beedles (2012) who described pivot points as a place where key decisions that will determine the future direction of an organisation are central points of reference, around which everything else can revolve. Such points are highlighted as being important to practitioners in the context of a future PSSAM both in theoretical terms as well as having a practical place in the lifecycle work packages. Based upon the evidence in the literature, and the case study, specific points where the future direction is to be considered have been added to the model and are presented in Figure 6.3. In addition to aspects described earlier in this section from the primary writers

on system approaches a second representation, Figure 6.4, has been annotated with evidence factors from the wider alignment literature to further highlight why these characteristics are important to the pivot points in the PSSAM.

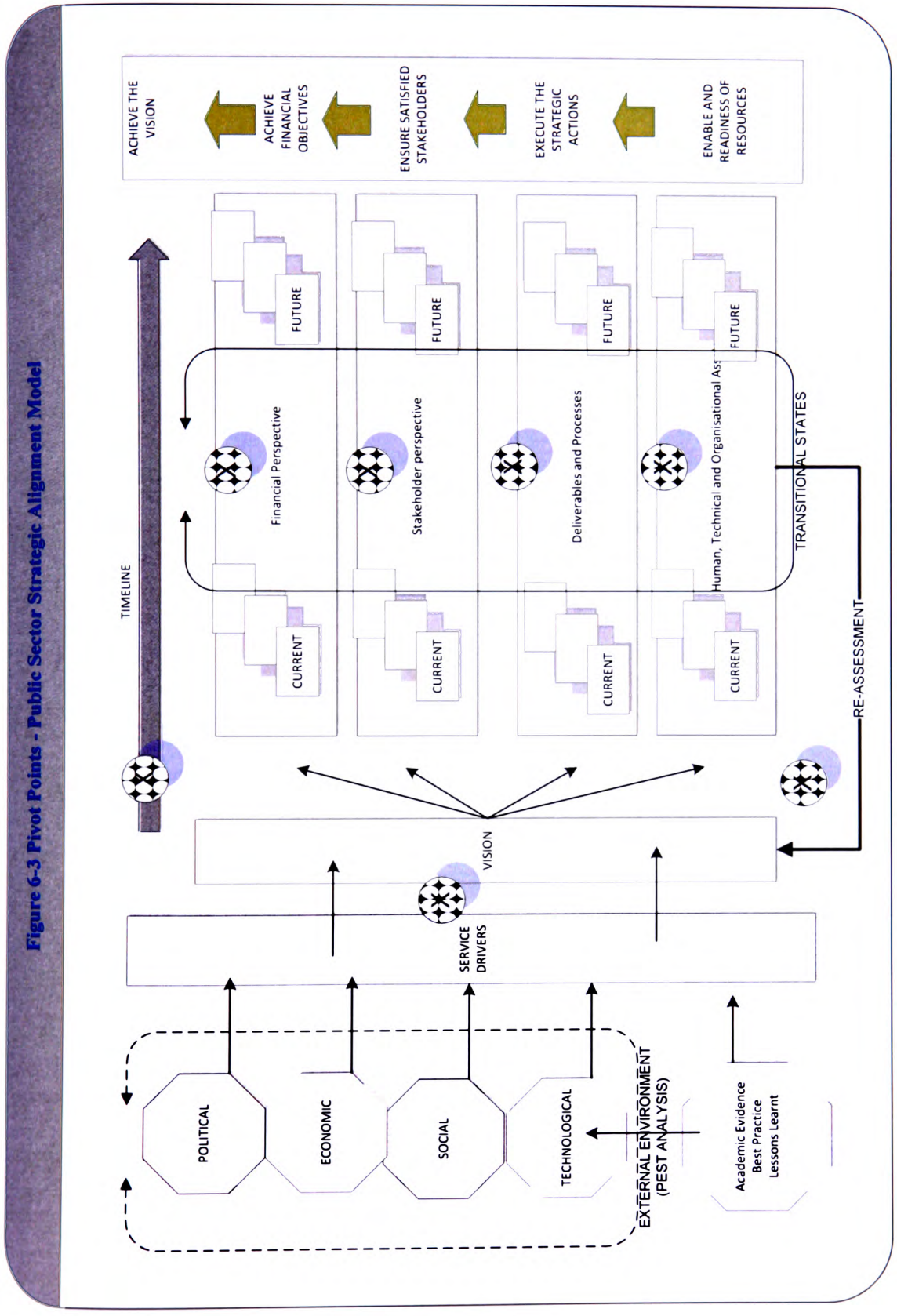
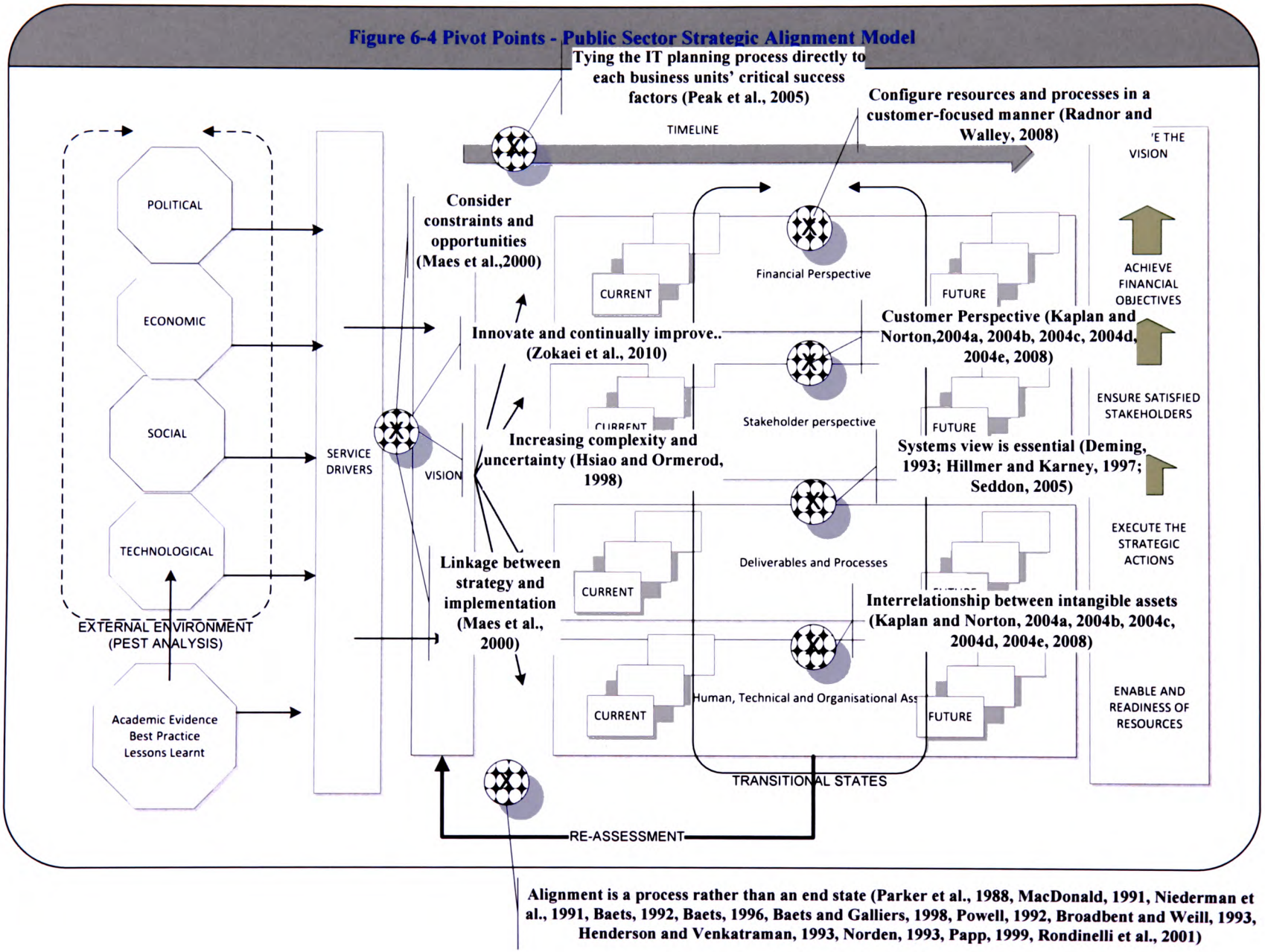


Figure 6-3 Pivot Points - Public Sector Strategic Alignment Model

Figure 6-4 Pivot Points - Public Sector Strategic Alignment Model



However, the pervading theme in the case study was the leadership through a clinician, the CAS, which was evident throughout the vision, initial business requirements, design, development, deployment and further builds upon aspects of leadership characteristics of system thinking described earlier. Working and building the team meant it was possible to identify knowledge gaps in not only the obvious areas but also the individuals' softer, hidden ones which were immediately addressed by personal intervention. Such close attention to detail was embraced by the individuals who adopted the solution and became firm advocates. The tone within the audiology department had been appropriate with just the right level of influence rather than 'control' usually experienced within project environments (Pellegrinelli, 2010). The CAS had built up a reputation in delivering solutions which were at the developing edge for new solutions to audiology problems and this was recognised by the Trust Hospital, commercial partner company and more nationally in the professional communities across England and Wales. The CAS still has significant influence at a strategic level with the supplier as a strategic partner.

As a result the impact of leadership went well beyond the boundaries of the department and highlights the importance of reputation in considering who is best placed to bring into the alignment decisions. This concurs with previous authors in this area and the influence of local, informal medical opinion leaders in the adoption of innovations in medical practice has been recognised for many years (Borbas et al., 2000) with this case study highlighting the significance within the context of Audiology. Bowens et al. (2010) draw attention to the important organisational dynamics of leadership and change management and its impact on successful integration of clinical workflow citing research which demonstrates the long term advantages of engaging and educating, promoting benefits, workflow efficiency and improvements to delivery of care through electronic health records. DeVore and Figlioli

(2010) go further in suggesting that opinion leaders, or clinical champions as they refer, should be involved from the beginning of the project, providing input to the design, workflow sign-off processes, and live support whilst communicating across multiple channels on a regular basis on the usability and benefits of the new technology. The case study has added further evidence to these findings but also suggests that additional benefits can be obtained by the clinical champion having and owning the vision from the start through all the process of change into future navigations as the external environment throws up continuing challenges and supported the recent English CSF in this area (NHS England, 2013).

The case study clearly demonstrated that leadership is a key area that NHS Wales must embrace in the area of ICT and service alignment and goes well beyond the nominal clinician appointment to support a particular initiative. To highlight the importance of this aspect the boundaries of leadership impact has been added into the PSSAM previously presented in Figure 6.5.

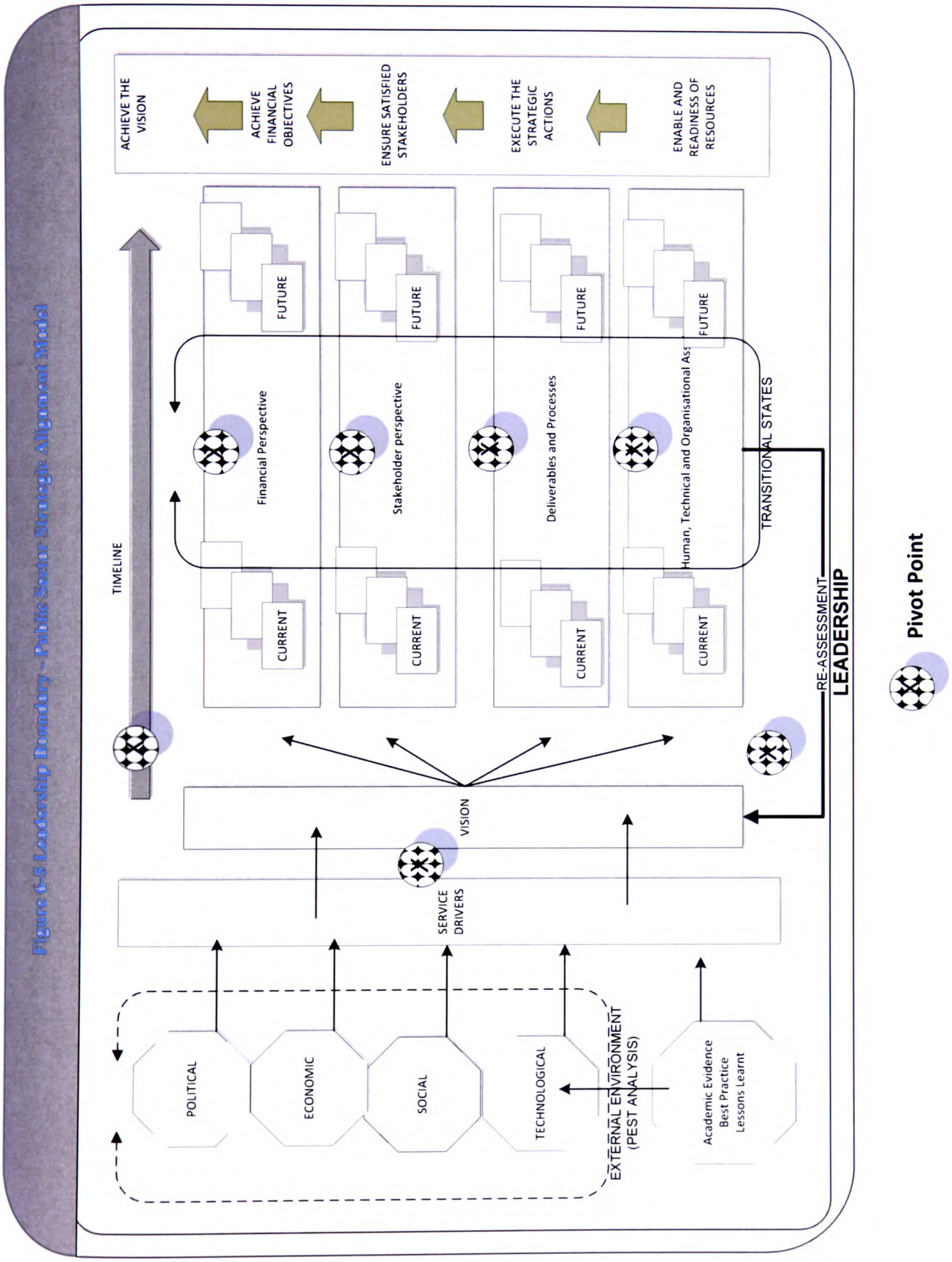


Figure 6-5 Leadership Boundary - Public Sector Strategic Alignment Model
ACHIEVE THE VISION
ACHIEVE FINANCIAL OBJECTIVES
ENSURE SATISFIED STAKEHOLDERS
EXECUTE THE STRATEGIC ACTIONS
ENABLE AND READINESS OF RESOURCES
TIMELINE
FUTURE
CURRENT
Financial Perspective
Stakeholder perspective
Deliverables and Processes
Human, Technical and Organisational Ass
TRANSITIONAL STATES
RE-ASSESSMENT
LEADERSHIP
VISION
SERVICE DRIVERS
POLITICAL
ECONOMIC
SOCIAL
TECHNOLOGICAL
EXTERNAL ENVIRONMENT (PEST ANALYSIS)
Academic Evidence
Best Practice
Lessons Learnt
Pivot Point

6.8 Key Research Conclusions

Luftman (1993) aimed to transform the SAM into a management tool by introducing alignment perspectives (Figure 3-6) suggesting that selecting one of four perspectives could induce the most appropriate approach to transform an enterprise. This research resonates with this metaphor of alignment pivots as throughout the conclusions around the literature and case study this work has provided an insight into the 'right' place for alignment decisions at an organisational point, level or individual.

The research draws the conclusion that in organisations the pivot point for alignment is where: the information gathered through a PSSAM; comes together with an individual who has and owns the benefits articulated through a vision; who has been empowered by the organisation; has the technical capability; the knowledge of the service requiring transformation being embodied within the working practices; in order to make decisions which ultimately will deliver the improved future way of working.

This has considerable resonance with Maes et al. (2000) who highlighted the need to consider alignment as a dynamic process, that ranges from strategy to implementation, takes the relevant business and technological contexts into account, pay clear attention to the human factors, considers alignment at different levels and is well balanced. All of these aspects were present within the case study and contributed towards its success and were contributory components at the pivot point.

In addition, the second major conclusion was around the impact of leadership which went well beyond the boundaries of the department and concurs with previous authors in this area around the influence of local, informal medical opinion leaders in the adoption of innovations

in medical practice (Borbas et al., 2000). Important organisational dynamics of leadership and change management with its impact on successful integration of clinical workflow Bowens et al. (2010) demonstrates the long term advantages of engaging and educating, promoting benefits, workflow efficiency and improvements to delivery of care through electronic health records. They suggest that they should be involved from the beginning of the project, providing input to the design, workflow sign-off processes, and live support whilst communicating across multiple channels on a regular basis on the usability and benefits of the new technology. The case study suggests that additional benefits can be obtained by the clinical champion having and owning the vision from the start through all the process of change into future navigations as the external environment throws up continuing challenges and their involvement is particularly relevant at the pivot points within the first research conclusion.

The factors expressed are included within the presented PSSAM which with the additions of measurability, and not targets, can be taken together to provide practitioners with improved approaches to alignment of ICT and NHS Wales services.

Chapter 7 – Conclusions on Alignment

7.1 Conclusions on alignment

This chapter concludes the study and serves several purposes. Firstly, in this section, it identifies how the research aims have been fulfilled. Secondly, it draws conclusions on the importance of the research and its significance on key organisations undertaking or researching alignment. Thirdly, the chapter considers the contribution to knowledge that has been achieved within the field study. Fourthly, it considers the contribution to practice that has been achieved as a result of the literature review and case study. Fifthly, the limitations of the study were recognised. Lastly, the author identifies the opportunities of how this research could be further developed.

The aim of the research was to consider the issues surrounding such attempts at alignment within the NHS context by considering behaviours, use of methodologies and guidelines for improving practice whilst comparing with published literature in existing and new domains of knowledge. To reflect upon the practical perspective, a longitudinal case study was undertaken in an area which had demonstrated the perception of effective alignment between the audiology service and technology in an NHS environment. The review of the literature was successful in highlighting some of the key issues that practitioners need to consider and address to improve alignment and an analysis of the methods and methodologies available to the practitioner, including those drawn from new domains of knowledge, demonstrated the complexity, variety and in some cases overlap of approaches within this field. Two key conclusions come from the study and analysis which are importance to the practitioner and academic being the creation of a PSSAM and the identification of the extended role of the clinical lead in a changing dynamic environment surrounding decisions around alignment in NHS Wales. In addition the value of the study is significantly enhanced in providing a detailed understanding of the components to be considered, the enablers and inhibitors drawn

from external published surveys and complemented by the experiences of participants drawn from the case study.

7.2 Fulfilment of Research Aims

The overall aim of this study set out in section 2.1 has been fulfilled within the strict validity and reliability criteria expected of a research thesis of this type. The first element of the thesis was to develop a clear aim for the study and this was undertaken following the context review within chapter two which framed the areas for the literature review in chapter three where the areas of enquiry were concluded. This was achieved by drawing upon information from several sources. Initially, a thorough literature search undertaken through academic search engines produced academic journals, business surveys and other sources which are presented in chapter three of this thesis with the results structured into potential alignment approaches. This highlighted that overall there is a lack of agreement in the literature as to how firms do and should align (Maes et al., 2000). The literature search produced limited evidence around PSICT alignment and more widely a focus on theoretical rather than empirical studies, but other aspects point to disagreement as to how alignment is most effectively researched (Reich and Benbasat, 2000, Avison et al., 2004). The review demonstrated that conceptual integration remains a relatively young field or domain (Scott-Morton, 1991, Hsiao and Ormerod, 1998). Henderson and Venkatraman (1990) quoted Scott-Morton's work which highlighted that successful organizations could be distinguished by their ability to leverage IT capabilities to transform their businesses (structures, processes, and roles) to obtain new and powerful sources of competitive advantages in the marketplace.

Looking for fundamental insights and guidance from existing frameworks (administrative and operational) they reflected on their limitations around the lack of articulation of the

fundamental logic and rationale for exploiting IT capabilities as well as the complexities of the organizational transformation required to leverage technological capabilities. This resulted in their proposal of a model for research and practice of strategic management of IT which they termed the Strategic Alignment Model (Henderson and Venkatraman, 1990) which extended by elaborations of Luftman (1993, 1996) is still the unchallenged and dominant conceptual model for business – IT alignment (Maes et al., 2000). Luftman (1996), Burn (1997), Yetton (1997), and Hsaio and Ormerod (1998) provide some examples of enablers and inhibitors of alignment, but the literature provides minimal guidance on how to achieve alignment between business and IT strategies.

Writers in other domains have made contributions to the alignment debate and amongst these were Deming who argued the alternative approach as being to understand and manage organizations as systems (Zokaei et al., 2010). From his work and those of other writers on management thinking, methodologies have emerged which can be deployed and used within the work environment. Further review considered these available methodologies which could be employed to facilitate alignment drawn from the literature as well as more commonly used practical solutions. The choice of an improvement methodology would be guided by its ability to influence alignment over as many of the SAM quadrants and their dimensions as possible whilst the selection of a process improvement methodology is dependent on the culture and optimal fit with the organisation (Nave, 2002). The specificity of some techniques such as TOC limit their usefulness to particular aspects suitable for alignment. Others such as ST have influences over more of the SAM quadrants and bring strength to the importance of the customer through a strict focus on demand.

Whilst the literature research has identified a significant body of writing in support of ICT business alignment the process used to achieve strategy alignment remains under-researched (Srivannaboon and Milosevic, 2006) and the nature of alignment is inadequately clarified in

the literature (Avison et al., 2004). Following identification of the key elements and methodologies available to influence alignment it was possible to consider the second strand of the research.

The second strand of the study was to explore and evaluate alignment within a successful NHS Public sector environment i.e. an area which demonstrated value for money. This was undertaken through a longitudinal case study set out in chapter four and findings in chapter five of the thesis. Utilising the six research objectives established in chapter three it was found that strategies had minimal influence upon original innovation and development of IS products.

An iterative process of development brought proven benefits which was in the absence of the use of alignment methodologies or formal project structure. In addition, the use of new approaches in current thinking, philosophy or other approaches drawn from within the new domains of knowledge were not identified.

The study did provide sufficient evidence to establish that previous conceptual alignment models required updating and enhancement to be appropriate to a public sector environment. This data provided key inputs into developing a PSSAM and additional enablers and inhibitors which contributed to the research aim.

Chapter six set out the analysis using the three strands of previous existing knowledge (chapters two and three); the models and methodologies available to the practitioner (chapter three); and the primary research undertaken within this longitudinal case study (chapter five). It sets out the route map towards a revised practical approach supported by an updated PSSAM. The route map sets out the components to be considered utilising the structure of more evidence based approaches coalesced into a time based iterative perspective. The

PSSAM uses the structure of the route-map but expands the detail of key factors to be aware of whilst bringing in enablers and inhibitors from international surveys and the case study.

7.3 Key implications for organisational stakeholders

This research has significance for several organisations, governmental decision makers (namely the WG), National Technology Bodies, Health Boards, the academic community, private sector suppliers, and practitioners. The PSSAM route map presented within Figure 6-1 sets out the inter-relationships between the external environment, evidence drawn from academic and best practice, the vision and the differing perspectives to be considered in the PSSAM. To improve alignment all stakeholders should consider and address the factors highlighted within the PSSAM set out in Table 6-19 supplemented by additional information around the context and external environment within Table 6-18. The following section considers the implications for the above stakeholders within the context for Wales.

The literature and case study drew out multiple strands which have importance for stakeholders although the exact recipient who would benefit varied according to the identified item. In terms of definition there is a distinction between the WG and national informatics agencies (NIA) who are pursuing policy and strategies on behalf of either the Welsh or UK government.

Health organisations, alignment practitioners and NIA's must be aware of the changing expectations driven through technology and social change and influenced by the economic situation as addressed by politicians both in Wales and beyond. Therefore, it is important to ensure that external environment scanning becomes more centre stage to its activities of reconnaissance work for alignment to ensure any vision or strategy under development or review takes into account likely changes or identified risks utilising a simple PEST model or similar variation. Inevitably, the feedback from this exercise will impact upon service driver

requirements and subsequently the vision and stakeholders. This iterative approach will need to continue as both the work progresses towards achievement and the environment changes to ensure alignment at a visionary level.

In addition, health organisations, alignment practitioners and NIA's should ensure that alignment is considered at lower levels rather than designing within a top down framework. Several aspects require consideration: firstly, solutions are more effectively designed, delivered and deployed under governance in close proximity to the service requiring support within the authority of individuals who have service knowledge linked with a technical competence to produce practical solutions. These individuals should be part of the service and take up a leadership role across the whole spectrum of the project from vision to design, development, deployment and to continue the role into the future iterations. This is particularly important for more bespoke departmental solutions which would benefit from an approach whereby product selection, and development, is made at the nearest level to the clinical process it is planning to support and by those who will operate it on an operational basis. As indicated the individual must demonstrate leadership which goes beyond the boundaries of the department, hospital and health organisation and highlights the importance of linking in someone whose reputation in the profession is recognised and will therefore be more effectively placed to consider and deliver alignment decisions. Secondly, the organisational field is not one which has common processes, infrastructure or skill levels and resulting strategies need to recognise that more emphasis is necessary to address legacy issues within the planning, design, development and implementation phases. Thirdly, a proximity issue exists around considering alignment perspectives or setting objectives. The operation of governance committees to oversee alignment and allocate or prioritise resources must be in place close to the organisations workflow rather remotely having to rely on reports to choose between alternative projects. This can be achieved by improved empowerment and

authority in line with the leadership choice. Fourthly, cohesive alignment will require a skilled, experienced and motivated close knit team established well before any projects are put in place who will be the beneficiaries of the new solution and are intimately involved in its design, testing and implementation (DeVore and Figlioli, 2010). The design and development work will involve these individuals who will work iteratively with the developer or supplier to provide a workflow and process which will achieve the overall vision (DeVore and Figlioli, 2010). Finally, all of this requires an effective understanding of each others perspective starting with consensus building throughout the strategy (Deming, 1986, Neave, 1990) and continuing through the solution development although this needs to be an iterative process rather than a static one, such as PDCA cycles (Deming, 1986) and continued over a long period of time (Deming, 1986, 1993, Hillmer and Karney, 1997). All of these factors collectively will link the underlying processes to operational benefits to the strategic objectives and finally steps towards the original vision (Kaplan and Norton, 2004a, 2004b, 2004c, 2004d, 2004e, 2008).

From a health organisation perspective there must be a greater recognition of local innovation, particularly in early stages of research and development, which can be derived from opportunistic events. This challenges any imposition of 'one way only' strategy (Ciborra, 1997, Brown and Magill, 1998) that can limit opportunities, progress and stifle creative approaches. The organisation must ensure that an alignment opportunity through innovation although challenging the current status quo should be considered (Maes et al., 2000) and balanced with the additional benefits to stakeholders. This will introduce new opportunities to address aspects which have emerged from the PEST analysis in time to be deployed.

The WG must be aware of the impact of policy and initiative announcements. Changes to solutions are continually highlighted as a result of developing requirements for stakeholders.

This sets out a scenario where there is a need for a continuing alignment process around every solution to be implemented over an extended time and not just at its initial deployment (Hsiao and Ormerod, 1998, Maes et al., 2000). This will assist where new governmental initiatives arise and by undertaking a status review within the context of the PSSAM will identify areas affected or identify constraints (Goldratt and Cox, 2004). This would in particular aid an understanding of where the last strategy had directed the service, make the linkages around interdependencies (Deming, 1993) and highlight any potential pre-existing shortfalls in current solutions, supplier capacity and capability, solution design and current capabilities. This reinforces the need for the profile and importance of IT as an critical business enabler (Peak et al., 2005) being highlighted with politicians and planners to improve their understanding of the impacts and limitations when considering any aspect of structural change (Maes et al., 2000). This can also include being made aware of the likely impact upon the market place and development potential of future solutions. This will require changes to established working relationships throughout all levels of the NHS system, particularly into the WG and the politics arena, to include the examination of proposals in the context of technology alignment by practitioners and service professionals in that area prior to the announcement of initiatives.

For suppliers and academic institutions the value of working iteratively with practitioners around their processes to provide an enabled consistent workflow has been highlighted as a source of innovation. In addition, further links should be made between the academic sector and health organisations to turn some of the evidence based approaches identified into contributions towards organisation visions. This must be undertaken in a shared risk environment to include small and young innovative enterprises.

There remains an opportunity to enable the Public Services in NHS Wales to introduce innovation whilst also achieving significant economies of scale (benefits) and underpin

service changes to accommodate the reducing financial envelope. This requires an approach which brings enhanced alignment of business priorities and ICT requirements to provide more effective outcomes which are themselves delivered in a timely and quality assured manner. Therefore, it is critical that the alignment of service and technology is moved more centrally to the decision and investment discussions. To aid the inter-relationships between (the external environment, the organisations vision and the differing perspectives) the aspects described must be considered in order to turn implementations into achieved strategic objectives and vision. Having established the significant issues influencing alignment within NHS Wales, the next section considers the contribution to knowledge achieved in this study.

7.4 Contribution to Knowledge

This section identifies the significant contribution made to the knowledge area by the research undertaken within this thesis.

7.4.1 Literature review

The study undertook a literature review and identified a range of general alignment literature and a number of conceptual alignment models (Henderson and Venkatraman, 1990, Scott-Morton, 1991, Henderson and Venkatraman, 1993, Yetton et al., 1994, Hsiao and Ormerod, 1998, Papp, 1999). Key writers on alignment, highlighted in chapter three, refer to gaps in the alignment literature and highlight characteristics which they suggest as having alignment aspects. Uniquely, alignment considerations were expanded by considering writers who were established within their own field of theory and practice but had a contribution to make to the area to produce a consolidated table of alignment characteristics and factors (Appendices I and J).

The study's next consideration was conceptual models and, for the first time, tested them for their clarity (defined as differences between them are fairly clear and must work in practice)

and utility (there must be some point to the categorisation e.g. does it provide insights or knowledge that are of practical benefit) utilising criteria from O'Brien (1995) and were presented in Appendix K. This highlighted that none of the models provided clear fundamental or substantial knowledge, had limited well proven knowledge with values more as a frame of reference. This builds on previous work identified in the literature by Henderson and Venkatraman (1990) as elaborated by Luftman (1996) and the additional components outlined by Maes et al. (2000) but is a unique perspective within the literature on alignment.

Emanating from the wider alignment literature review were more practical and academic constructed methods and methodologies and the study provided a fresh perspective to the value of such models, indications as to where they can add value to the store of knowledge on alignment and also assist the practitioner (Appendix L). Whilst registering a more positive outcome than conceptual models, an enhanced evidence base with more depth through use, clarified that only a few approaches (Table 6-6) cover the majority of alignment components, feature specific interactions or traverse the wide landscape of ICT and Business alignment to bring knowledge or aid decisions.

Thus the study presented a consolidated summary of factors that require embedding within any conceptual model or for a more practical use to alignment in the future and tested their value for reference. The outcome is valuable and demonstrated that the available methods varied in their ability to match up to the requirements criteria to produce an ascendant alignment model. Whilst some were limited from an alignment perspective several were identified as encompassing what can be described as knowledge and would aid decision making. The literature also highlighted the importance of enablers and inhibitors through the SIM surveys (Luftman et al., 2006, Luftman and Kempaiah, 2008) and these factors were

presented in Tables 6-16 and 6.17 thereby presenting an opportunity to consider alignment from a different perspective.

7.4.2 Longitudinal case study

The second major contribution to knowledge was the research undertaken through a longitudinal case study in an area which had demonstrated good NHS service and IT alignment in an audiology department within the NHS Public sector. This represented new evidence being the first time any research had been undertaken into one of the first advanced software solutions for hospital-based audiology clinics starting from the original ideas, drawn from academic papers, through design, development and its deployment across Wales. The detailed examination and findings provided an insight into the differing perspectives which came into the alignment success and identified additional enablers and inhibitors factors to add to knowledge base alongside the SIM survey. In addition, the importance of iterative work in all areas of alignment work whether it be external analysis, communication, development, or future planning was clearly highlighted. Two new factors were identified of importance:

- the important extended position of the clinical champion in their leadership role going beyond the existing documented boundaries as the impact of accessible technology becomes more commonplace
- and the importance of deciding the correct pivot point whereby all alignment decisions can be taken by such extended clinical champions.

7.4.3 Analysis

Further examination sought insights into the study utilising three distinct analyses resulting in a number of key findings being reported:

- that despite no formal use of methods and methodologies the alignment was successful nor did it disprove the value of them,
- highlighted that deployment of the practical models and methodologies would have been useful to elicit responses and identify potential dependencies,
- the size and scope of the solution may have influenced effectiveness of available approaches,
- supported the value that structured approaches could bring in managing interdependencies,
- highlighted the common aspects emanating from earlier writers (outlined in chapter three),
- indicated that changes are required when considering analysis perspectives of alignment components.

The first key area which is not clearly captured in the current set of conceptual models links back to the changes in the wider external environment which will in turn determine factors and responses to facets around stakeholder requirements. Given that the subject area is the public sector more attention needs to be given to the political directives being delivered within the prevailing economic conditions whilst recognising changes of attitude and behaviour in society particularly in regard to the type, availability and use of technology.

A second area identified is the tensions in public services between local service delivery requirements and national ICT approaches focused at a high level. This also brought into focus the effect of rapidly merging use of technologies in the service environment with the case study highlighting the importance of key leaders having the confidence to deploy technology having technical expertise as well as the service knowledge and experience.

In addition, the enablers and inhibitors comparison provided new insights when compared to the SIM studies and previous work undertaken (Luftman et al., 2006, Luftman and Kempaiah, 2008). The case study had a number of unique qualities foremost in that a high level of technical expertise was evident within the department champion who demonstrated leadership at all levels. More practical factors were identified which could be classified as a context specific but include wider issues around the importance of knowledge (Deming, 1986, 1993) required about technology within the department. Another difference was in the development process, where locally supplier developed solutions alongside the staff who refined the processes and ensured the resultant development was in accordance with their clinical and administrative requirements. The consolidation of previous analyses in the study provides an embracing conceptual viewpoint to add to the literature and was enhanced through the presentation on an updated PSSAM model (Figure 6-1), both in terms of time and new influences, which was more relevant to a public sector perspective.

7.4.4 Key conclusions

To conclude, the contribution made by this research is important having:

- for the first time tested and summarised conceptual alignment models, methods and methodologies for their clarity and utility in order to highlight fundamental or substantial knowledge and considered whether they cover the majority of alignment components, feature specific interactions or traverse the wide landscape of ICT and business alignment in order to aid decisions
- undertaken research into the life cycle of one of the first advanced software solutions for hospital-based audiology clinics starting from the original ideas through design, development and its deployment across Wales.

- identified the important extended position of the clinical champion in their leadership role and the importance of deciding the correct pivot point whereby all alignment decisions are taken.
- identified new components which had previously received little reference in the alignment literature being:
    - links back to the changes in the wider external environment,
    - the effect of rapidly merging use of technologies in the public service environment,
    - the importance of key clinical leaders having the confidence to deploy technology having both technical expertise as well as the service knowledge and experience,
    - support through new enabling characteristics around leadership, iterative development process, and identification of factors more prevalent to the public sector.

The next section builds upon the contribution to knowledge and references its contribution to practice.

7.5 Contribution to Practice

This section identifies the contribution made to the area of practice by the research undertaken within this thesis. Success is more likely when using accepted principles and techniques (O'Brien, 1995) and this study gives the IS practitioner a valuable insight into many areas and methodologies which have been promoted by their advocates. It contributes:

- an analysis of the limitations for each approach when addressing alignment scenarios
- findings from the case study being an opportunity to examine a successful public sector alignment

- a presented alignment approach through a PSSAM and associated guidance and interpretations.

7.5.1 Analysis of limitations to methodologies

The initial analysis tested the existence or the level of knowledge within selected methods and methodologies thus providing a detailed analysis to assist the practitioner in consolidating individual understanding over the contribution they bring to the alignment environment. The second analysis reported which models were sufficiently robust or inclusive enough to embrace a high proportion or all of the alignment aspects specified in the literature (Tables K-1, L-1, L-2 and L-3). This concluded that there are three approaches which are available to the practitioner which had the potential, if deployed, to address evidenced items identified within the literature, can be described as knowledge and would aid decision making in a public sector context. Other knowledge gathered in chapter three had identified significant critical success factors (Luftman et al., 2006, Luftman and Kempaiah, 2008) which remain useful in their own right but needed to be tested out in a public sector environment rather than global companies in order to have value to the working practitioner. This was examined through the case study findings in chapter five.

7.5.2 Findings from the case study

The next contribution highlighted that the case study was successful even in the direct absence of formal methods and methodologies. Although some areas could have been improved, the empirical study established that the participants had within their team the necessary knowledge for the scope and size of the design and deployment. This led to the conclusion that aspects of scale are important when considering use of alignment approaches. The case study comparisons with the literature highlighted a number of emerging themes over the treatment of the changing external environment as risks for the practitioner, through the iterative nature of many components during design, development and communications

and final reconciliation to the vision and objectives. The iterative nature had a significant enabling component through leadership at all levels of the study which played an important position in the decision points to ensure the direction of the solution. This was highlighted as a key alignment pivot point which will be of significance to all projects containing an alignment objective and adds a new dimension to the practitioner around the clinical champions role and endorsement. For the practitioner this was described as a pivot point for alignment decisions and the need to take place where:

- the information gathered through a PSSAM,
- comes together with an individual who has and owns the benefits articulated through their vision,
- who has been empowered by the organisation,
- has the technical capability,
- the knowledge of the service requiring transformation being embodied within the working practices,
- in order to make decisions which ultimately will deliver the improved future way of working.

The original conceptual tools remained in a format which could not easily be used to support practice and therefore a more intuitive and iterative approach was required to draw together the strengths of current methodologies, characteristics from the literature and insights derived from the case study evidence. The original conceptual framework presented by Luftman (1996) was challenged and updated to be more relevant for a more modern and public sector context.

7.5.3 Public Sector Strategic Alignment Model (PSSAM)

The analysis concluded that a PSSAM was required to assist the practitioner in undertaking alignment transformations in the working environment. This was conceptually based around two approaches, well used in practice, but containing similar and overlapping components. After consideration within chapter six additional elements were added to complement the PSSAM with aspects which were absent. This addressed the following issues:

- adaptability to a number of alignment situations,
- ability to link strategy to implementation,
- identify cause and effect,
- include a focus on the more intangible assets,
- facilitate a measurement of progress,
- and identify the stages of transition over time.

The study concluded by stressing and highlighting the iterative nature of all processes and the overriding need to reinforce this with suitably qualified, skilled and empowered leadership across all aspects of alignment. To achieve this a PSSAM schematic was presented in Figure 6-1 supplemented by narrative over the principal components. These components within the PSSAM were signposted to the literature to support the provenance of perspectives, aspects, case study enablers and inhibitors. This was considered to be a significant contribution to the practitioner enabling the PSSAM to be deployed with some supporting explanation and is presented in Table 6-19. This concluded the section which is followed by a brief statement over the limitations of the study.

7.6 Limitations of study recognised

This section will appraise the limitations of the thesis and identify potential improvements. The author of this thesis recognises that the research and findings of this qualitative study

was undertaken with a number of limitations which require recognition. The longitudinal case study was focussed on departments in a North Wales context and would be improved by extending the study to other centres across the UK. This would also address the fact that the participants interviewed were a small sample of seven individuals albeit across a number of different staff groups and skills. The centres from which the participants were drawn were primarily two hospital audiology departments within a Welsh context and the conclusions drawn may therefore be more relevant to local alignment approaches rather than immediate extrapolation to wider boundary initiatives. The research would have benefited from a comparative approach through qualitative studies of national alignments and less successful implementations had the opportunity and resources been available. As a result, the PSSAM proposed in Figure 6-1 would require further testing in other national health service contexts within both UK and the wider world. There is a need to further develop the PSSAM to act as a realistic road map for practitioners and to stimulate effective networking between academia and industry to ensure a cross fertilisation of ideas and practice to provide more effective alignment.

7.7 Further research and opportunities

As part of the approvals given by the LHB to undertake the research is the publication of the main findings to be placed in the R&D register for sharing with the wider health community. The author has indicated throughout the study a number of areas which would benefit from extended study and these will form the basis of future work and discussions.

The author intends to encourage a wider base within practitioners to develop research opportunities and comparative studies to further investigate the pressing need to bring together the developing informatics national solutions with locally derived processes. Such activity will develop and enhance the body of knowledge and provide further evidence

regarding the importance of alignment and the need to understand and act upon its multiplicity of components. To start this work, immediate reinforcement must be put in place to encourage the recording of the knowledge gleaned in a format which will encourage the professional to engage and appreciate its value.

More widespread, within the informatics discipline, is a need for improved relationships between the practitioners, research community and all aspects of the public services decision and policy makers. The author would implore that new initiatives be tested against the underlying legacy infrastructure, the rocks upon which many of the objectives flounder, before releasing expectations to the wider citizen. This would involve repeating the analysis with the previously outlined PSSAM to ensure existing processes are not compromised, skills and capacity exist within the NHS, and innovation has delivered appropriate solutions to bringing likely success through implementation.

The case study highlighted how dependence upon a dominant company can become a potential immoveable monopoly supplier and further consideration needs to be given to the position of the national informatics supplier in Wales in order to embrace innovation and avoid a stagnant downward spiral as resources decline at a time of technological revolution in mobile working and technical social mobility. This requirement embraces work to improve alignment through a deeper analysis of the changing external impacts. A dearth of action to embrace this challenge will miss the opportunities for citizen co-production and jeopardise the vision for a digital approach within Wales. In addition, analysis is required over the future effect of carrying the additional development risks, sub optimal systems and processes leading to reduced forward capability. Further urgent attention is required to assess how national programmes could change their approach, mitigate their attendant functionality deficiencies and delivery timescale slippages.

The author would advocate consideration of re-establishing the vision of IHC where the initial approach was to establish commercial strategic partners as a platform and to consider further work being commissioned to widen working with suppliers in a competitive dialogue approach to better understand the solutions limitations and stakeholders requirements without the complexity of requirements production. This should extend well beyond the initial contract agreement and into the design and development stages to assist the iterative nature of this work whilst not compromising contractual rigour. Further facilitation is required into how young innovative companies can step over the threshold of the public sector procurement barriers to entry at an early stage of their life cycle and whilst they remain nimble and proactive in their solution development.

The study indicated an absence of alignment where top down processes have not been aligned to local systems and processes and further work is required to address other variations which exist between other health boards which could be embraced through extending the quality initiatives which are underway. Many of the variations have resulted from the fragmentation emanating from politically driven reorganisations and additional recognition to these impacts needs to be undertaken and documented to better consider alignment consequences and answers, for and before, future organisational changes. Future strategies will require enhancement to understand and present approaches to dealing with ICT variation and consider placing more emphasis on the adoption of successful existing solutions in building towards a vision rather than solely presenting an unfathomable utopia.

Finally as indicated within the research limitations the knowledge base would benefit from a series of comparative qualitative studies of national alignments and less successful implementations where opportunities and resources are available.

Guided by these issues the author intends to continue to liaise and network to improve the relationships between the research community and practice in order to develop further research opportunities particularly as the national ICT solutions are developed and deployed. Such activity will develop and enhance the body of knowledge and provide evidence around the alignment reality. More generally, within the informatics discipline there is a need for improved and ongoing relationships between the research community, the national and local programmes to share reflective work to improve alignment which will continue into the future supporting the business needs of NHS Wales.

Appendices

Appendix A : Literature Review Procedures

Table A-1 Key author search, academic databases accessed and search terms used

Google Scholar (key author searches, citations)						
Ref	Search Terms	Search Filters	Search Area	Results	Preview	Timeline
Z	Business and information technology alignment models	Citation numbers		18300		October 2010
Science Direct						
Ref	Search Terms	Search Filters	Search Area	Results	Preview	Timeline
A1	Strategic Alignment, Project management	None	Abstract, Title, Keywords	10	7	October 2010
A2	Implementing Strategy, Project management	None	Abstract, Title, Keywords	79	-.-	October 2010
A3	Implementing Strategy, Project management	Strategic Alignment,	Abstract, Title, Keywords	13	13	October 2010
C	Strategic Alignment	Project Management	Abstract, Title, Keywords	116	44	October 2010
D	Strategic alignment	Project management	Abstract, Title, Keywords All Fields	93	65	October 2010
	Alignment, strategic	Public sector	Abstract, Title,	0	0	October

	alignment, ICT and service alignment		Keywords			2010
E	Implementing Strategy, strategic alignment	Int Jnl of Proj Managemen t	Abstract, Title, Keywords	8	8	October 2010
G	System of Profound Knowledge	System, Deming	Abstract, Title, Keywords	167	7	October 2010

Emerald Management Extra

Ref	Search Terms	Search Filters	Search Area	Results	Preview	Timeline
B	Strategic Alignment, Project management	None	Abstract	33	31	October 2010
B	Implementing Strategy, Project management	None	Abstract	73	29	October 2010

Business Source Premier

Ref	Search Terms	Search Filters	Search Area	Results	Preview	Timeline
H1	Information System development methodologies		Abstract	60	31	August 2014
H2	Avison, David	information	Author All	73	73	August 2014
H3	Agile		Abstract	3227	-.-	August 2014
		Information	Key words	43	25	
		Information and public sector	Key words	1	1	

Appendix B : Research Participants - Inclusion and Exclusion Criteria

Inclusion Criteria

Inclusion Criteria of participants for:

Stage 1 – Historical context (pilot) interviews and observation of research area.

Stage 3 – Interviews with individuals to gain detailed perspectives.

Audiology Department participants will be included if:

1. They work or worked within the boundaries of the Betsi Cadwaladr University Health Board or its predecessor organisations.
2. They were involved in any stage of the specification, design, development or deployment.
3. They were a fully trained user of the auditdata software solution or were involved in the support thereof.
4. They were involved in the selection or implementation of the solution.
5. They were or are active users of the auditdata software solution.
6. They were working in the audiology service before and after the auditdata software was deployed.
7. They are able to communicate in English.

ICT Department or Managers will be included if:

8. They work or worked within the boundaries of the Betsi Cadwaladr University Health Board or its predecessor organisations.

9. They were involved in any stage of the specification, design, development or deployment.
10. They were involved in the support of the auditdata software solution.
11. They were involved in the selection or implementation of the solution.
12. They were or are managers of active users of the auditdata software solution.
13. They were working in the audiology service before and after the auditdata software was deployed.
14. They are able to communicate in English.

'auditdata' software suppliers will be included if:

15. They were involved in any stage of the specification, design, development or deployment.
16. They were a fully trained user of the auditdata software solution or were involved in the support thereof.
17. They were involved in the selection or implementation of the solution.
18. They are able to communicate in English.

Exclusion Criteria

Exclusion Criteria of participants for:

Stage 1 – Historical context (pilot) interviews and observation of research area.

Stage 3 – Interviews with individuals to gain detailed perspectives.

Audiology Department participant will be excluded if:

1. They were outside the boundaries of the Betsi Cadwaladr University Health Board or its predecessor organisations.
2. They were not involved in any stage of the specification, design, development or deployment.
3. They were not a fully trained user of the auditdata software solution or were not involved in the support thereof.
4. They were not involved in the selection or implementation of the solution.
5. They were not or are not active users of the auditdata software solution.
6. They were not working in the audiology service before and after the auditdata software was deployed.
7. They are not able to communicate in English.

ICT Department or Managers within the boundaries of the Betsi Cadwaladr University Health Board or its predecessor organisations will be excluded if:

8. They were outside the boundaries of the Betsi Cadwaladr University Health Board or its predecessor organisations.
9. They were not involved in any stage of the specification, design, development or deployment.
10. They were not involved in the support of the auditdata software solution.
11. They were not involved in the selection or implementation of the solution.
12. They were not or are not managers of active users of the auditdata software solution.
13. They were not working in the audiology service before and after the auditdata software was deployed.
14. They are not able to communicate in English.

'auditdata' software suppliers will be excluded if:

15. They were not involved in any stage of the specification, design, development or deployment
16. They were not involved in the support of the auditdata software solution
17. They were not involved in the selection or implementation of the solution
18. They are not able to communicate in English.

Appendix C: Sample Participant Invitation Letter

Study Title: Study of alignment of ICT and NHS Wales business services

Dear _____ ,

My name is Mike Lugg. I am a postgraduate researcher in the Faculty of Business and Society at the University of Glamorgan. I am conducting a research study as part of the requirements of my degree in Doctor of Business Administration (DBA) Public Services Management Wales and I would like to invite you to participate.

I am investigating whether national strategies, structured methodologies, strategic alignment models, or methods from new domains of knowledge influence or improve alignment between Information Communication Technologies (ICT) and NHS Wales business services. If you decide to participate, you will be asked to meet with me for an interview about the auditbase solution which was successfully implemented into the Audiology Department and used extensively over the last ten years.

In particular, you will be asked questions in the following areas which will be used as a basis for the research.

5. Which transformation factors appear critical to the effective implementation and alignment of ICT in NHS Wales in an austere environment?
6. What is the impact of these identified transformational factors in improving the organisational efficiency and sustainable change in NHS Wales?
7. What alignment methodologies underpin the implementation and sustaining of transformation in the NHS Wales context?
8. What are the main impediments that prevent the adoption of identified alignment factors within the ICT sector in NHS Wales?

The meeting will take place at a mutually agreed upon time and place, and should last about 60 minutes. You do not have to answer any questions that you do not wish to. The interview will be audio recorded so that I can accurately reflect on what is discussed. The recordings will only be transcribed, reviewed and analysed by myself. If required, the examining body may request access to confirm that the research interviews took place when I submit my thesis. Following submission and its review they will be confidentially destroyed.

Although you probably won't benefit directly from participating in this study, I hope that others in the informatics community in NHS Wales will benefit by a better understanding of the important factors which can make alignment of ICT and Business Services more beneficial.

Participation is confidential. All study information, documents and consent forms will be safely stored in locked cabinets (office) and cupboards (home). Access will be restricted to the researcher.
An NHS laptop computer will be employed which is encrypted and password controlled. This will be used to store identifiable data of participants including a participant ID.

A personal laptop will be used to store audio files, transcriptions and analysis. Such files will be stored utilising a participant reference number only. The laptop access will be password protected and all files will also be password protected.
No data will be directly identifiable to the person surveyed either in the project report or in any correspondence or face to face contact between the researcher and the organisation which employs the interviewees. Only anonymous extracts and summaries of the data will be included in the main body of the DBA or in any material which is to be used within the public domain

Taking part in the study is your decision. You do not have to be in this study if you do not want
to and you may also leave the study at any time or decide not to answer any question you are not comfortable answering. Please see the Participant Information Sheet (PIS) which outlines what will be expected of you.

I will be happy to answer any questions you have about the study. You may contact me via email: mike.lugg@btopenworld.com or telephone 07890 529103 or my academic supervisor Dr WP Jones via email wpjones1@glam.ac.uk or telephone 01443 654128 if you have study related questions or problems.

If you would like to participate, please reply to this email request and I will contact you to arrange a convenient time and location. Prior to the date I will forward a consent form for your consideration which will require your completion and signature before I can make further contact.
Thank you for your consideration of this request.

With kind regards,

(Signature)

Mr Mike Lugg

Contact Details:
(supplied with original)

Appendix D: Participant Information Sheet

In this study you will be asked to meet with me for an interview and to release any documentation or archival data about the auditbase solution which was successfully implemented into the Audiology Department and used extensively over the last ten years.

The study is attempting to identify:

> Which transformation factors appear critical to the effective implementation and alignment of ICT in NHS Wales in an austere environment?
>
> What is the impact of these identified transformational factors in improving the organisational efficiency and sustainable change in NHS Wales?
>
> What alignment methodologies underpin the implementation and sustaining of transformation in the NHS Wales context?
>
> What are the main impediments that prevent the adoption of identified alignment factors within the ICT sector in NHS Wales?

This will be achieved by the researcher :

> undertaking an interview with yourself which will involve you recalling and responding to a set of semi-structured questions around the above areas
>
> examining any document and archival data provided by yourself which provides a picture of events during the specification, design, procurement, development, deployment and subsequent use of the solution within the Audiology Department
>
> observing the solution in the working environment in order to understand how the technology is used within the workflow and provide information for the Audiology Services.

Once the study has commenced you will retain the right to withdraw at any point.

It is anticipated that the findings will be written up and submitted as part of a thesis for my DBA Public Services Management with the University of Glamorgan and, if requested, presented in summary to Informatics and Audiology professionals as part of development sessions.

No data will be directly identifiable to the person surveyed within: the project report; any correspondence; or face to face contact between the researcher and the organisation which employs the interviewees. Only anonymous extracts and summaries of the data will be included in the main body of the DBA or in any material which is to be used within the public domain.

Once completed all identifiable data will be destroyed under confidential conditions.

Please contact for further information: Mike Lugg (supplied with originals)

If you have any questions or would like to participate, please ask the researcher for a consent form

Appendix E: Submissions Criteria and Checklist of Documents

Document Requirements For Submission – Electronic and Hard Copy (Betsi Cadwaladr University Health Board, 2011)

All research projects requiring review by the R&D Internal Review Panel must be sent to the NISCHR Permissions Co-ordinating Unit (PCU) for Wales. Electronic versions of the documents listed below must be sent via e-mail to: NISCHR.PCU.ALLWALES@wales.nhs.uk

Submissions should include *(bold are mandatory documents – without them an application cannot be accepted)*:

1. **The Checklist** – this is generated in IRAS from the Checklist tab, all documents included in the submission must be noted here
2. **signed NHS R&D Application Form** - you can find the online application form at https://www.myresearchproject.org.uk (this must be sent in pdf(1) and xml(2) format)
3. **signed NHS Site Specific Information form** from the same website (this must be sent in pdf(3) and xml(4) format)
4. **Research Proposal** (protocol)
5. Supporting documents as appropriate (lay summary, Investigator's Brochure or Summary of Product Characteristics, copies of questionnaires, treatment schedule, diary cards, interview schedule, etc.)
6. Participant Information Sheet(s)
7. Consent Form(s)
8. Letter to the Consultant/GP (if appropriate)
9. **Investigators' CV** and where relevant the **academic supervisor's CV.**
10. **Evidence of Insurance/Indemnity (if the study sponsor is non-NHS)**
11. Any other supporting document you might consider helpful (funding details, pharmacy haematology etc. agreements)
12. Risk Assessment form – for Clinical Trials of Investigational Medicinal Products

N.B. All documents must have a version number and date

Table E-1 Checklist of IRAS Documents

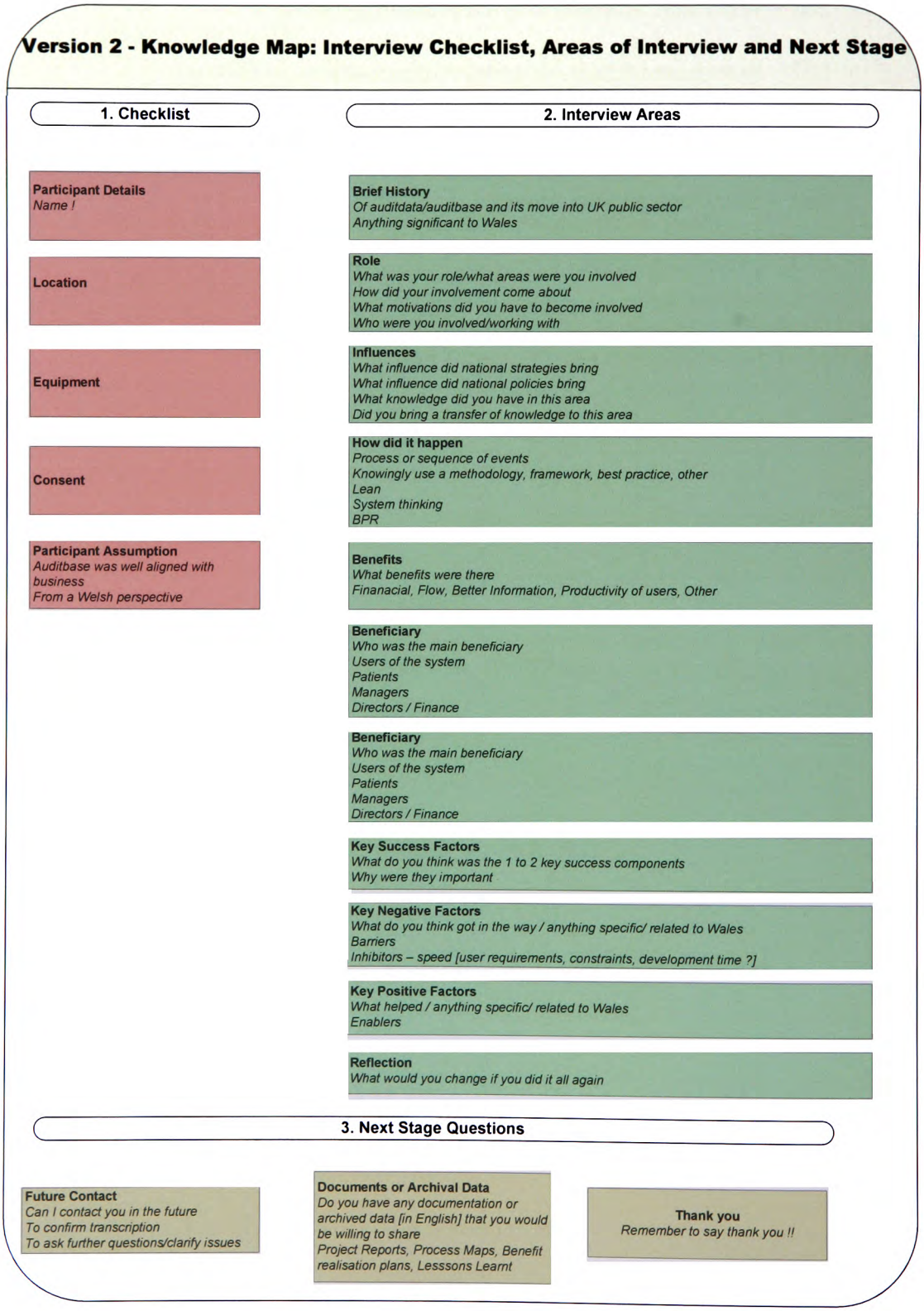
	Checklist of Documents
1	Checklist (pdf).
2	R&D Form (pdf).
	R&D Form Authorisation –Chief Investigator (pdf).
	R&D Form Authorisation – University Sponsor (pdf).
	R&D Form Authorisation – Academic Supervisor (pdf).
3	R&D Submission (XML).
4	Research Protocol
5	Summary CV for Chief Investigator
6	Participant information sheet
7	Participant consent form
8	Letters of invitation to participant
9	Evidence of Sponsor insurance or indemnity
10	Summary of protocol (diagram).
11	Interview Schedule
12	SSI – Ystbyty Gwynedd Audiology (pdf).
	SSI – Ystbyty Gwynedd Audiology (XML).
	SSI – Ystbyty Gwynedd Authorisations Audiology
	SSI – Ystbyty Gwynedd IT (pdf).
	SSI – Ystbyty Gwynedd IT (XML).
	SSI – Ystbyty Gwynedd Authorisations IT
	SSI – Glan Clwyd Hospital Audiology(pdf).
	SSI – Glan Clwyd Hospital Audiology(XML).
	SSI – Glan Clwyd Hospital Authorisations Audiology

	SSI – Abergele Hospital IT(pdf).
	SSI – Abergele Hospital IT(XML).
	SSI – Abergele Hospital Authorisations IT
	SSI – Wrexham Maelor Hospital Audiology (pdf).
	SSI – Wrexham Maelor Hospital Audiology(XML).
	SSI – Wrexham Maelor Hospital Authorisations Audiology
	SSI – Wrexham Maelor Hospital IT (pdf).
	SSI – Wrexham Maelor Hospital IT(XML).
	SSI – Wrexham Maelor Hospital Authorisations IT

1. **The Checklist** – this is generated in IRAS from the Checklist tab, all documents included in the submission must be noted here

Appendix F: Knowledge Map: Interview Checklist, Areas of Interview

Figure F-1 - Knowledge Map: Interview Checklist, Areas of Interview



Appendix G: Sample Participant Consent Form

Name of Participant:

Title of the project: Study of alignment of ICT and NHS Wales business services

Researchers' contact details: Mike Lugg (specifics supplied with original)

1. I have been provided with a copy of the Participant Information Sheet. I have read and understood this and all my questions have been answered to my satisfaction. ☐

2. I understand that I am free to withdraw from the research at any time, for any reason and without prejudice. ☐

3. I have been informed that the confidentiality of the information I provide will be safeguarded and that any personal information identifiable to me will not be shared with anyone other than the Researcher. ☐

4. I am free to ask any questions at any time before and during the study. ☐

5. I agree to take part in the above research. ☐

Name of participant (print).....

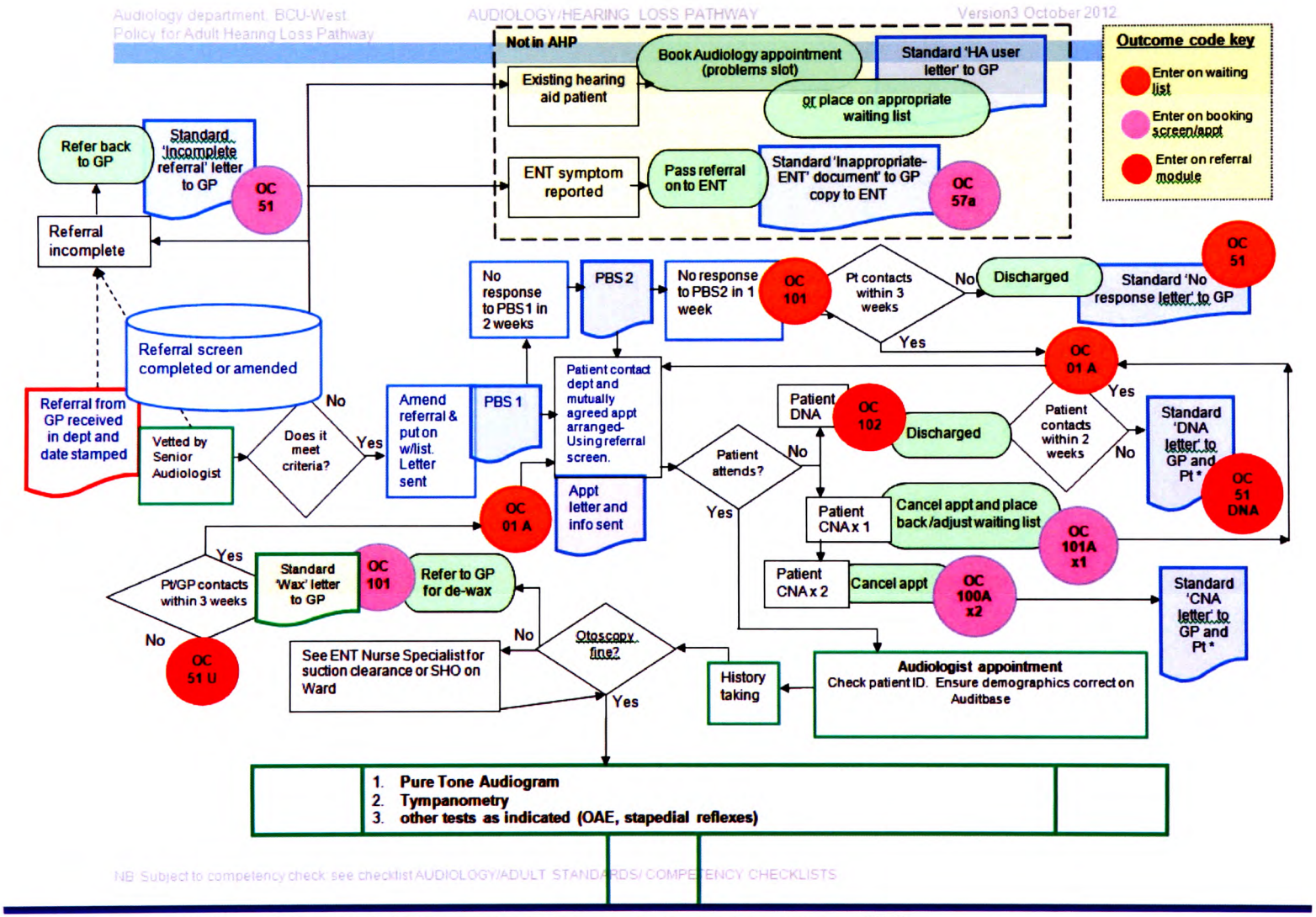
Signed..... Date.....

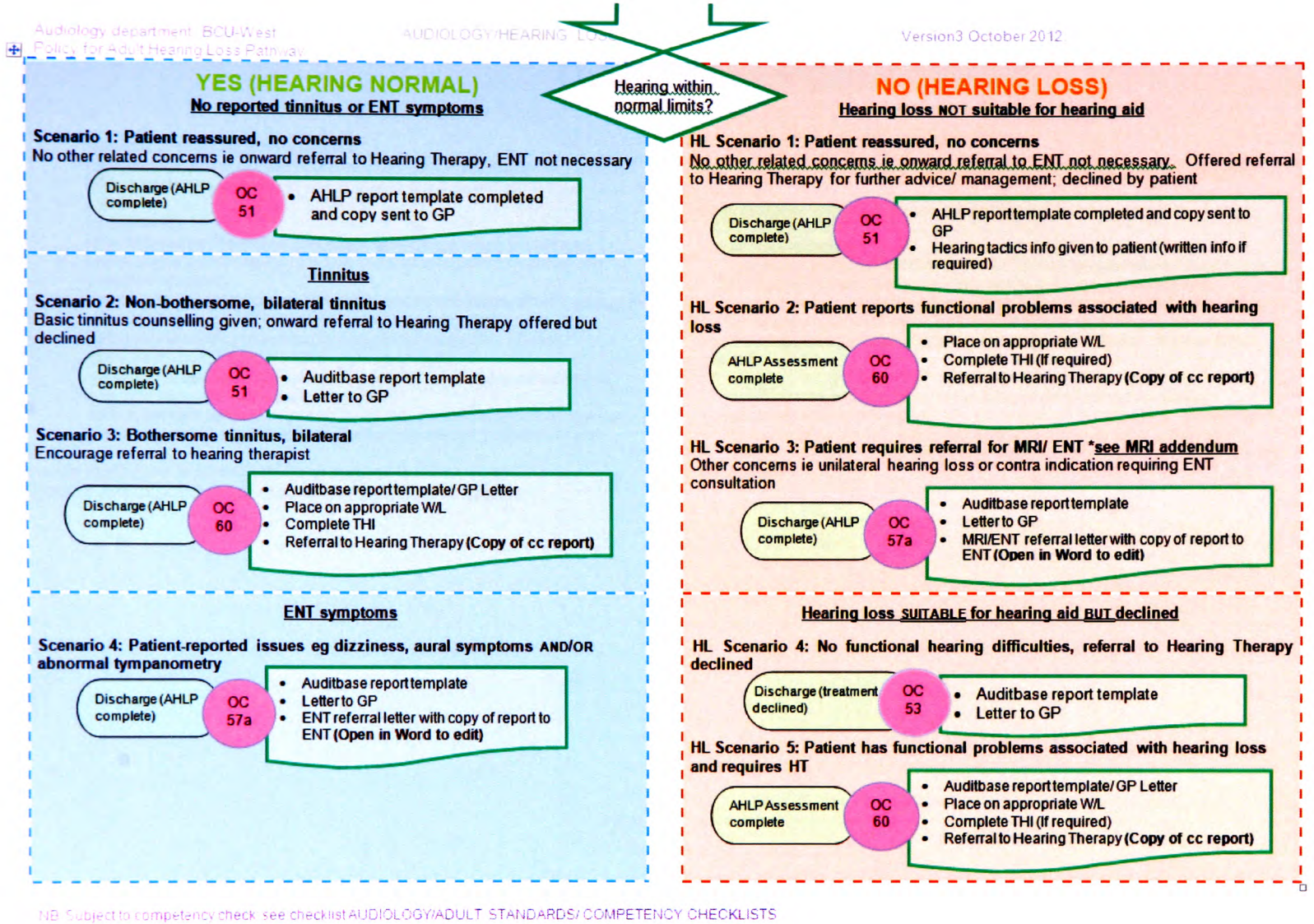
Name of researcher taking consent Mike Lugg

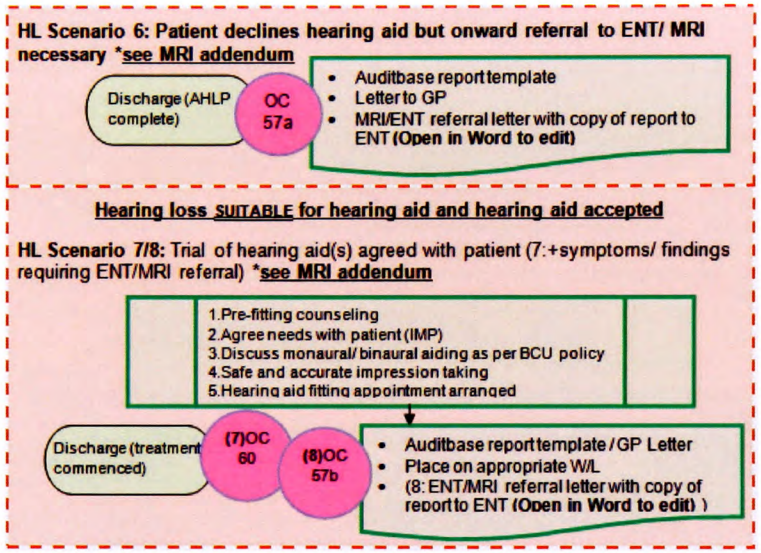
Signed..... Date.....

Appendix H: Process Model Of Sample Audiology Service

Figure H-1 Process Model Of Sample Audiology Service




Audiology department BCU-West
Policy for Adult Hearing Loss Pathway
AUDIOLOGY/HEARING LOSS
Version3 October 2012
Hearing within normal limits?
YES (HEARING NORMAL)
No reported tinnitus or ENT symptoms
Scenario 1: Patient reassured, no concerns
No other related concerns ie onward referral to Hearing Therapy, ENT not necessary
Discharge (AHLP complete)
OC 51
AHLP report template completed and copy sent to GP
Tinnitus
Scenario 2: Non-bothersome, bilateral tinnitus
Basic tinnitus counselling given; onward referral to Hearing Therapy offered but declined
Discharge (AHLP complete)
OC 51
Auditbase report template
Letter to GP
Scenario 3: Bothersome tinnitus, bilateral
Encourage referral to hearing therapist
Discharge (AHLP complete)
OC 60
Auditbase report template/ GP Letter
Place on appropriate W/L
Complete THI
Referral to Hearing Therapy (Copy of cc report)
ENT symptoms
Scenario 4: Patient-reported issues eg dizziness, aural symptoms AND/OR abnormal tympanometry
Discharge (AHLP complete)
OC 57a
Auditbase report template
Letter to GP
ENT referral letter with copy of report to ENT (Open in Word to edit)
NO (HEARING LOSS)
Hearing loss NOT suitable for hearing aid
HL Scenario 1: Patient reassured, no concerns
No other related concerns ie onward referral to ENT not necessary. Offered referral to Hearing Therapy for further advice/ management; declined by patient
Discharge (AHLP complete)
OC 51
AHLP report template completed and copy sent to GP
Hearing tactics info given to patient (written info if required)
HL Scenario 2: Patient reports functional problems associated with hearing loss
AHLP Assessment complete
OC 60
Place on appropriate W/L
Complete THI (If required)
Referral to Hearing Therapy (Copy of cc report)
HL Scenario 3: Patient requires referral for MRI/ ENT *see MRI addendum
Other concerns ie unilateral hearing loss or contra indication requiring ENT consultation
Discharge (AHLP complete)
OC 57a
Auditbase report template
Letter to GP
MRI/ENT referral letter with copy of report to ENT (Open in Word to edit)
Hearing loss SUITABLE for hearing aid BUT declined
HL Scenario 4: No functional hearing difficulties, referral to Hearing Therapy declined
Discharge (treatment declined)
OC 53
Auditbase report template
Letter to GP
HL Scenario 5: Patient has functional problems associated with hearing loss and requires HT
AHLP Assessment complete
OC 60
Auditbase report template/ GP Letter
Place on appropriate W/L
Complete THI (If required)
Referral to Hearing Therapy (Copy of cc report)
NB Subject to competency check see checklist AUDIOLOGY/ADULT STANDARDS/ COMPETENCY CHECKLISTS



Contra-indications [BAA document September 2009]

Contra-indications requiring referral to ENT/GP

History:

- Persistent pain affecting either ear (defined as earache lasting more than 7 days in the past 90 days before appointment); History of discharge other than wax from either ear within the last 90 days
- Sudden loss or sudden deterioration of hearing (sudden=within 1 week, in which case send to A&E or Urgent Care ENT clinic)
- Rapid loss or rapid deterioration of hearing (rapid=90 days or less)
- Fluctuating hearing loss, other than associated with colds
- Unilateral or asymmetrical, or pulsatile or distressing tinnitus lasting more than 5 minutes at a time
- Troublesome, tinnitus which may lead to sleep disturbance or be associated with symptoms of anxiety or depression Abnormal auditory perceptions (dysacuses)
- Vertigo
- Normal peripheral hearing but with abnormal difficulty hearing in noisy backgrounds; possibly having problems with sound localization, or difficulty following complex auditory directions.

Ear examination:

- Complete or partial obstruction of the external auditory canal preventing proper examination of the eardrum and/or proper taking of an aural impression.
- Abnormal appearance of the outer ear and/or the eardrum (e.g., inflammation of the external auditory canal, perforated eardrum, active discharge).

Audiometry:

- Conductive hearing loss (CHL), defined as 25 dB or greater air-bone gap present at two or more of the frequencies tested: (500 to 4000 Hz inclusive).
- Evidence of deterioration of hearing by comparison with an audiogram taken in the last 24 months, defined as a deterioration of 15 dB or more in air conduction threshold readings at two or more of the frequencies tested: (500 to 4000 Hz inclusive).

Contra-indications requiring further investigations

Audiometry:

- Unilateral or asymmetrical sensory-neural hearing loss. *See MRI Referral flowchart for further details.

Table H-1 Process Action Codes

Central Codes
0 Referral received - Clock start
01A (Count) Assessment Pathway continues START
01T (Count) Treatment Pathway continues START
100 Pathway closed
100Ax1 1st CNA assessment stage STOP
100Ax2 2nd CNA assessment stage STOP
100Tx1 1st CNA teatment stage STOP
100Tx2 2nd CNA Treatment stage STOP
101 Clock suspended
102 DNA
103 Follow up Complete
104 Follow up appt
51 DIS Discharged/Referred back to GP
51 DNA/CNA Discharged back to GP
52 Treatment Commenced today
53 Treatment Offered but Declined by patient
54 Active Monitoring commenced today
56 Patient treated elsewhere whilst waiting
57A Referred to another consultant within the Trust
57B Decision to treat & refer to consultant
58 Referred to tertiary centre treatment
60 Added to WL / decision to treat
61 T Awaiting outcome of diagnostic test
65 T No decision made - await further review
C04 Surgery begun
C20 3 months Review completed
C35 Annual review B completed
C40 Annual review C completed
C45 Annual review D completed

Appendix I: Aspects Reported to improve alignment

Table I-1 – Aspects reported to improve alignment

Characteristic	Descriptive Example(s)	Reporting Author(s)
Adaptability not static alignment, capable of dealing with change	… differing organisational structures and business processes and operating in differing environments are likely to require different approaches to alignment.	Maes et al. (2000)
	… not 'one design fits all contexts' in alignment	(Brown and Magill, 1998, Ciborra, 1997)
	… questionable in an era where such uncertainty and flexibility predominate	(Ciborra, 1997)
	… articulation of the strategic intent is difficult	(Ciborra, 1997)
	… constantly in need of adjustment	Galliers (2004)
	… increasing complexity and uncertainty	Hsiao and Ormerod (1998,p 21)
Consider constraints and opportunities – human, technological, managerial	… it should take the relevant business and technological contexts into account;	Maes et al. (2000)
	… it should pay clear attention to the human factors;	Maes et al. (2000)
	… it should be well balanced, taking the practical restrictions of management seriously with no component, not even strategy, by definition leading	Maes et al. (2000)
	… can distort creative thinking	(Mintzberg, 1987)
Dynamic process	… it should consider alignment as a dynamic process;	Maes et al. (2000)
	… a process which leads to this outcome	(Burn, 1997 p.85)
	… a dynamic process	(Labovitz and Rosansky, 1997, Venkatraman, 2000,

		Ciborra, 1997)
	... maintain alignment dynamically	(Coakley et al., 1996, Gunn, 1997)
	... alignment is a process rather than an end state	(Parker et al., 1988, MacDonald, 1991, Niederman et al., 1991, Baets, 1992, Baets, 1996, Baets and Galliers, 1998, Powell, 1992, Broadbent and Weill, 1993, Henderson and Venkatraman, 1993, Norden, 1993, Papp, 1999, Rondinelli et al., 2001)
Evidence base	... paucity of studies that assess how organisations carry out alignment in practice	(Avison et al., 2004)
Linkage between strategy and implementation	... it should consider alignment at different levels, ranging from strategy to implementation	Maes et al. (2000)
	... a reference framework incorporating strategic and implementation perspectives	Maes et al. (2000)
Measurability	... it should attempt at measurability;	Maes et al. (2000)
	... Tying the IT planning process directly to each business units' critical success factors	(Peak et al., 2005)
Principle	... it should start from an unequivocal definition of alignment;	Maes et al. (2000)

Appendix J: Aspects Reported to improve alignment from alternative management domains

Table J-1 – Aspects reported to improve alignment - Alternative Management Domains

Characteristic	Descriptive Example(s)	Reporting Author(s)
Organisational Approach to change – flexible, adaptive	… Adaptive, integral	Seddon, 2005
	… Ensure structural flexibility and adaptability to various organizational forms and … Circumstances	Osama, 2006
Attitude to customers – most important	… customer was the most important judge of quality	(Neave, 1990, p. 136).
	… What matters…?	Seddon, 2005
	… configure resources and processes in a customer-focused manner	(Radnor and Walley, 2008)
	… Focus on value (in the context of the customer)	(Radnor and Walley, 2008)
	… Customer Perspective	Kaplan and Norton (2004a, 2004b, 2004c, 2004d, 2004e, 2008)
Change process supports emergent approach	… embraces the concept of an emergent approach to change	(Seddon and Caulkin, 2007 p.15) (Zokaei et al., 2010)
Communication	… Encourage effective two-way communication and other means to drive out fear… so that everybody may work effectively and more productively	(Deming, 1986) Neave (1990)
	… define the organization's purpose and to communicate that purpose to all employees.	Deming (1993)

Continual improvement – reduce variation, improve quality, reduce delays and defects, reduce costs, focus financial perspective	… plan to become competitive, to stay in business, and to provide jobs	(Deming, 1986) Neave (1990)
	… Improve constantly and forever every process for planning, production, and service…. work continually on the system	(Deming, 1986) Neave (1990)
	… bulk of the causes of low quality and low productivity belong to the system…	(Deming, 1986) Neave (1990)
	… need knowledge about variation… to do with reducing variation	Neave, 1990
	… no longer live with commonly-accepted levels of delays, mistakes, defective materials, and defective workmanship	(Deming, 1986) Neave (1990)
	… emphasis on effectiveness thinking rather than efficiency thinking	Zokaei et al. (2010)
	… building quality into the product in the first place	(Deming, 1986) Neave (1990)
	… ability of local service providers to innovate and continually improve.. unintended impact of targets/ measures	(Zokaei et al., 2010)
	… staff to generate the analysis of what is wrong with a process and how to make improvements	(Radnor and Walley, 2008)
	… Elimination of waste.. … Reduce work-in-progress … Save staff time … Speed up processes	(Radnor and Walley, 2008)
	… Reduce costs..improve quality and dependability	Bhatia and Drew (2006)
	… Financial perspective	Kaplan and Norton (2004a, 2004b, 2004c, 2004d, 2004e, 2008)

	… Reduce process variation, improve flow, improve quality	(Leach, 2005)
Identify and Design key processes – to support vision, demand, value and flow	… Demand, value and flow	Seddon, 2005
	… Key processes require identification to link to delivery	Kaplan and Norton (2004a, 2004b, 2004c, 2004d, 2004e, 2008)
Interrelationship of culture, systems, components, organisation, stakeholders, financial, intangible assets and vision	… Consider wider system	Seddon (2008)
	… a systems view was essential to modern management..i.e. " a network of interdependent components that work together to accomplish the aim of the system"	Deming (1993), (Hillmer and Karney, 1997)
	… to recognize and manage the interdependencies between components… resolutions of conflicts, and removal of barriers to cooperation	Deming (1993)
	… focuses on the interrelationship between the various parts of the organization	Seddon, 2005
	… Break down barriers between departments and staff areas… must work in teams to tackle problems that may be encountered with products or service	(Deming, 1986) Neave (1990)
	… The aim of the system must be clear to everyone in the system. The aim must include plans for the future	Deming (1993)
	… Culture, managerial structure, lines of accountability	(McNulty and Ferlie, 2004)
	… Stakeholder priorities within the wider system	Bhatia and Drew (2006)

	... Understand the system, identify constraints	(Goldratt and Cox, 2004)
	... Interrelationship between intangible assets, processes to achieve, delivering customer and financial expectations and achieving vision	Kaplan and Norton (2004a, 2004b, 2004c, 2004d, 2004e, 2008)
Leadership – helping, integrate decisions into work, act on system, improve quality	... Adopt and institute leadership aimed at helping people to do a better job	(Deming, 1986) Neave (1990)
	... Aid and helpful leadership in order to achieve continual improvement of quality and productivity	(Deming, 1986) Neave (1990)
	... Clearly define top management's permanent commitment to ever-improving quality and productivity	(Deming, 1986) Neave (1990)
	... Act on the system	(Deming, 1986) Neave (1990)
	... Decision making – Integrated with work	(Deming, 1986) Neave (1990)
	... Employee driven change	(Radnor and Walley, 2008)
Long term relationship with suppliers	... long-term relationship of loyalty and trust.... aim is to minimize total cost, not merely initial cost	(Deming, 1986) Neave (1990)
	... Partnering and co-operation inc suppliers	Seddon, 2005
Measurement against purpose, performance expectations	... Designed against purpose, demonstrate variation	Seddon, 2005
	... organised feedback that compares results with these performance expectations	Kaplan and Norton (2004a, 2004b, 2004c, 2004d, 2004e, 2008)
Motivation – intrinsic and at all levels	... Remove the barriers... their right to pride of workmanship	(Deming, 1986) Neave (1990)
	... nurture intrinsic motivation...	Deming. 1986

	extrinsic motivation (factors that originate outside the individual) has a destructive effect	
	… Intrinsic	Seddon, 2005
	… Participation at all levels is essential.. sustainability	(Jackson, 2003 p.106
Outside in perspective	… Outside – in	Seddon, 2005
Training and knowledge – vigorous program of training, education and self improvement	… Institute modern methods of training on the job for all, including management, to make better use of every employee	(Deming, 1986) Neave (1990)
	… Institute a vigorous program of education, and encourage self-improvement for everyone	(Deming, 1986) Neave (1990)
	… Capacity and capability	(McNulty and Ferlie, 2004)
	… Human Capital perspective	Kaplan and Norton (2004a, 2004b, 2004c, 2004d, 2004e, 2008)
Understand cause and effect	… Improve quality. Costs decrease because of less rework, fewer mistakes, fewer delays, snags; better use of machine-time and materials. Productivity improves. Capture the market with better quality and lower price. Stay in business. Provide jobs and more jobs"	(Deming, 1986, p. 3).
	… Establish cause-and-Effect linkages between various performance perspectives	(Osama, 2006)

Appendix K: Categorisation of Conceptual Models and Frameworks utilising criteria from O'Brien (1995)

In order to assess the quality of any proposed categorisation he suggests two broad criteria: Clarity, is defined so that differences between them are fairly clear and must work in practice; and Utility, there must be some point to the categorisation e.g. does it provide insights or knowledge that are of practical benefit (O'Brien, 1995).

Table K-1 Categorisation of Conceptual Models and Frameworks utilising criteria from O'Brien (1995)

Categorisation	**Description**	**Strategic Alignment Model**	**Generic Framework**	**Integrated Architecture Framework**	**Unified Framework for Alignment**
Fundamental Knowledge	central to the job	*Doesn't set out fundamental principles – open to interpretation* (Henderson and Venkatraman, 1990), Luftman (1993, 1996)	*Based on the SAM. Described by own author (Maes, 1999) as a frame of reference*	*Aid to design of main architecture but considers design phases and special viewpoints. Nothing profound* (Maes et al., 2000)	*Combination of GF and IAF* (Maes et al., 2000 p.19) *And becomes less clear in how this adds knowledge to the alignment*
Substantial knowledge	brainpower and concentration are required to master	*Relatively easy to understand but has limited aspects to master*	*Set out that strategic and operational levels cannot be easily split in SAM. Introduces information, communications,*	*Based on design phases it would be possible to consider architectural aspects of the four areas.*	*Combination is less clear than individual parts*

Categorisation	Description	Strategic Alignment Model	Generic Framework	Integrated Architecture Framework	Unified Framework for Alignment
			customer thinking into model. Also considers cultural, political, financial aspects to counter strategy appearing predominant		
Well proven knowledge	That they work	*Limited evidence that application can be used*	*Frame of reference*	*Has more conceptual value in itself but limited evidence is provided that it is used.*	*Reduced conceptual value and limited evidence that it is or could be used*
Decision facilitating	Arrive at decisions	*Although facilitating discussion it doesn't itself get specific on what alignment perspective might be the correct one Further elaborations by Luftman into problem domain is obscure*	*Would further discussion of elements within the model but as stated is more a frame of reference*	*Decisions would be at a design stage level rather than at a strategic investment level.*	*Less clear now combined*

Categorisation	Description	Strategic Alignment Model	Generic Framework	Integrated Architecture Framework	Unified Framework for Alignment
Clarity	*differences between them are fairly clear; and must work in practice*	*Limited evidence that these are used in practice*	*Limited evidence that these are used in practice*	*Limited evidence that these are used in practice within this framework. Aspects seem suitable for partial use in design work.*	*limited evidence that it is or could be used*
Utility	*provide insights or knowledge that are of practical benefit*	*Provide initial insight as to potential domains but these now seem dated.*	*Enhanced the strategic operational split and more current in terms of customer and information potential but limited practical benefit*	*Partial insight and practical benefit*	*Limited practical benefit*

Appendix L: Categorisation of Methods and Methodologies utilising criteria from O'Brien (1995)

Table L-1 Categorisation of Methods and Methodologies utilising criteria from O'Brien (1995)

Categorisation	Description	ALIGN	Alignment Perspective	Technology Road-mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]
Fundamental Knowledge	central to the job	*Step methodology which highlights importance of alignment and sets out a continuous process cycle. Not fundamental knowledge* (Papp, 1999)	*Measurement of alignment rather than methodology* (Avison et al.(2004)	*framework within which the integrated business strategy can be charted*	*Framework within which the organisation can be performance measured. Developed into a general framework to translate strategies to objectives* Kaplan and Norton (2004)	*Recognised professional qualification backed approach set out in regularly updated text. Contributed by professionals.* *Can be used in a number of situations and transformation within/ outside ICT* Managing Successful Programmes (MSP) (Great Britain. Office of Government, 2007)
Substantial knowledge	brainpower and concentration are required to	*Steps are easy to understand but limited evidence on what to do as cycle through the*	*High level is straight forward but detailed analysis, not described, will be*	*built on mechanistic principles*	*The power of the BSC approach improves through familiarity*	*Examined qualification* *Processes, organisational state, technology state,*

Categorisation	Description	ALIGN	Alignment Perspective	Technology Road-mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]
	master	*alignment process*	*more challenging*			*information* *Central to transformation*
Well proven knowledge	That they work	*No evidence that this methodology works in practice*	*No evidence that this methodology used in practice*	*Built around well used Planning principles*	*companies using a formal system for implementing strategy outperform their peers several textbooks to support.*	*concept is based upon effective and efficient programme management practice to deliver transformational change*
Decision facilitating	Arrive at decisions	*Utilises alignment model to assess. Suggests that this is a process which embraces other methods to achieve the overall performance and profitability*	*Writers suggest that it will help to arrive at current alignment perspective and enable future direction to be decided having identified all the key components*	*does not include any inherent decision-making elements, more of a communication medium to promote discussion, consensus of direction*	*Translates quadrants into cause and effect relationships. Strong on management of intangible assets particularly Information Capital* *Less clear on forcing decisions*	*Forces decisions through examination of current and future state and considers transitions required to achieve. Changes to Business/ICT are considered as part of the same process POTI.*

Categorisation	Description	ALIGN	Alignment Perspective	Technology Road-mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]
Clarity	*differences between them are fairly clear; and must work in practice*	*Steps remain clear but limited in actual practical implementation*	*No evidence that this methodology works in practice*	*Clear outputs but limited scope to prioritised IT projects, view of information needs and concerns, links to strategic/ operational levels and Financial investment. Time based approach is important feature*	*Widely used and growing evidence of examples, developing over time,*	*drawn from experiences of both public and private sector organisations.*
Utility	*provide insights or knowledge that are of practical benefit*	*Very high level and would need further activities to address the individual steps*	*May have practical benefit for managers*	*must be supported by an appropriate decision process and set of tools.* *Has elements which could be useful (time based), lacks breadth to other factors*	*Insights into intangible assets and their value to support strategies with HR and IT programs*	*Is complementary to project management techniques and has practical use. Some elements have more limited use depending upon the size ad complexity of the transformation*

Table L-2 Categorisation of Methods and Methodologies utilising criteria from O'Brien (1995)

Categorisation	Description	Project Management	Business Process Reengineering	Theory of Constraints	Lean Thinking
Fundamental Knowledge	central to the job	*Recognised professional qualification backed approach set out in regularly updated text. Contributed by professionals.*	*Improvement technique* (Hammer and Champy, 1993)	*Improvement technique* (Goldratt and Cox, 2004)	*Improvement technique* (Womack et al., 1990)
Substantial knowledge	brainpower and concentration are required to master	*Examined qualification*	*Predominantly focussed upon rethinking and redesigning business processes*	*Limited to understanding a system and its constraints*	*Limited to flow.* *Techniques are reasonably easy to master by all aspects of the workforce in an empowered state*
Well proven knowledge	That they work	*Widely used*	*Lower per cent success in private sector linked with limited success in the public sector. Has merged into other Process Improvement methods*	*5 step process to improve system used*	*But has the customer as part of that flow. Also look to improve quality, reduce variation. Limited and challenged evidence that it works in public Sector.*
Decision	Arrive at	*Delivers outcomes within agreed business*	*Can help decisions to obtain dramatic and*	*Assume design correct, most economical,*	*Assume design correct, most economical, customer*

Categorisation	Description	Project Management	Business Process Reengineering	Theory of Constraints	Lean Thinking
facilitating	decisions	*case. Does not consider alignment per se..*	*sustaining improvements in quality, cost, lead-times, outcomes, flexibility and innovation*	*customer satisfied, configuration fulfils requirements, management structure supports change*	*satisfied, configuration fulfils requirements, management structure supports change. Cultural change aspects required*
Clarity	*differences between them are fairly clear; and must work in practice*	*Within its boundaries then PM works*	*Primary focus is on the business process, other tools are similar*	*Links to Deming, and those principles do find a place in the evidence base*	*Links to Deming, includes empowerment and motivation. Toyota is evidence of practice use*
Utility	*provide insights or knowledge that are of practical benefit*	*Is a useful insight and is practical*	*Primary insight has been overtaken by aspects of successful System Thinking application*	*Constraint identification and links to improving the system are useful.*	*Has practical benefit and is used to improve flow and quality in the system. Improves motivation*

Table L-3 Categorisation of Methods and Methodologies utilising criteria from O'Brien (1995)

Categorisation	Description	System Thinking	Critical Success Factors	Information Systems Development Methodologies
Fundamental Knowledge	central to the job	*Has its roots in lean,* Zokaei et al. (2010) and Seddon (2005)	*Approach within which the key factors which will influence success are highlighted and charted*	*Framework within which software development is plan or component driven*
Substantial knowledge	brainpower and concentration are required to master	*absence of toolkits or training courses to attend (action learning). emphasizes particular approaches in improving public services such as profound understanding of the purpose and demand in service delivery*	*Little knowledge is required to understand approach although application is much more demanding*	*Evidence suggest that they are useful to beginners rather than experienced practitioners*
Well proven knowledge	That they work	*Some evidence quoted in support within public sector*	*At best give an indication of areas to consider*	*Limited in practice or open to local interpretation*
Decision facilitating	Arrive at decisions	*system is assumed to be identified with a single unifying purpose. Must absorb variety* *Aids decisions but in an empowered way.*	*Only highlight expectations to which outcomes can be prepared, not a decision making tool.*	*Used more by mangers as a control of process rather than experienced practitioners who use as an assurance against failure*

Categorisation	Description	System Thinking	Critical Success Factors	Information Systems Development Methodologies
Clarity	*differences between them are fairly clear; and must work in practice*	*Focuses on the interrelationship between the various parts of the organization.* *Links to Deming*	*Primary factors are on highlighting what has to go right to increase chance of success.*	*Multiple (over 1000 reported) methodologies exist, limited evidence base over outcomes*
Utility	*provide insights or knowledge that are of practical benefit*	*Has practical benefit and is used to improve interrelationships. Introduces failure demand identification.*	*Has practical benefit although insights from other scenarios are not always a complete guide to the future*	*Has practical benefit for beginners and control aspects for managers*

Appendix M: Comparison of Literature Components with the Methods and Methodologies

Table M-1 Comparison of Literature Components with the Methods and Methodologies

Method/ Methodology / Literature Components	**ALIGN**	**Alignment Perspective**	**Technology Road- mapping/ IT Alignment planning**	**Balanced Scorecard / Strategy Map**	**Programme Management inc Blueprint [MSP]**	**Project Management**
I. BUSINESS STRATEGY	No	Partial	Partial	Partial	Partial	Not Clear
1. Business Scope	Depends on other models	Included in domain analysis	Included in graphical framework	Identifies vision	Identified in future state	Only identified if part of project scope
2. Distinctive	Depends on	Included in	Establishes market parameters and	Considers vision from stakeholder	Builds upon previously	May be identified as part of resource

Method/ Methodology / Literature Components	ALIGN	Alignment Perspective	Technology Road- mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]	Project Management
Competencies	other models	domain analysis	external drivers	perspective	identified business objectives	plan
3. Business Governance	Depends on other models	Included in structural analysis	Does not include inherent decision-making elements	Identifies key process activities to achieve objectives	Identified in Organisational aspect	Linkages to project board and team only
II. ORGANISATIONAL INFRASTRUCTURE AND PROCESSES	No	Partial	Partial	Yes	Yes	Not Clear
4. Administrative Structure	Depends on other models	References operational aspects	Limited consideration	Considers all intangible assets	Identified in Organisational section	Linkages to project board and team only
5. Processes	Depends on other models	References operational aspects	Considers process development and links to required technology	Specific quadrant dedicated to key process activities	Identified in Process assessment section	Only identified if part of project scope

Method/ Methodology / Literature Components	ALIGN	Alignment Perspective	Technology Road- mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]	Project Management
6. Skills	Depends on other models	Limited reference to Human Factors	Limited reference to Human Factors	Human capital is specifically assessed	Identified in Organisational section	May be identified as part of resource plan
III. IT STRATEGY	No	Partial	Partial	Yes	Yes	Not Clear
7. Technology Scope	Depends on other models	Included in domain analysis	Included in graphical framework, highlights transitions, developments	Information capital is considered	Identified in Technical section	Only identified if part of project scope
8. Systemic Competencies	Depends on other models	Referenced as part of domain analysis	Establishes technological capabilities	Considers from contribution to stakeholder perspective	Identified in Technical and Organisational sections	May be identified as part of resource plan
9. IT Governance	Depends on other models	Weak reference in structural analysis	Projects need prioritising outside of framework	Identifies key process activities to achieve objectives	Identified in Organisational aspect	Linkages to service board and change control only

Method/ Methodology / Literature Components	ALIGN	Alignment Perspective	Technology Road- mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]	Project Management
IV. IT INFRASTRUCTURE AND PROCESSES	No	Partial	Partial	Yes	Yes	Not Clear
10. Architecture	Depends on other models	Partial in domain analysis	Included in graphical framework	Information capital is considered	Identified in Technical section	Only identified if part of project scope
11. Processes	Depends on other models	References operational aspects	Does not consider specific IT process development	Specific quadrant dedicated to key process activities	Identified in Process assessment section	Only identified if service part of project scope
12. Skills	Depends on other models	Limited reference to Human Factors	Limited reference to Human Factors	Human capital is specifically assessed	Identified in Organisational section	May be identified as part of resource plan
V. Generic Framework	No	Partial	Partial	Yes	Partial	Not Clear
13. Information and Infrastructure	Depends on other models	Included in domain analysis	Links Information required for business to IT	Included in Information Capital	Identified in Technical and Information	Only identified if part of project scope

Method/ Methodology / Literature Components	ALIGN	Alignment Perspective	Technology Road- mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]	Project Management
			developments	assessment	sections	
14. Customer Thinking – links internal processes to stakeholder perspective	Customer thinking not pre-eminent	No reference	Limited reference to specific stakeholders, although does help to identify drivers	Clear link to stakeholder perspective	No specific reference in method	Customer thinking not pre-eminent
15. Core Competencies – further emphasis.	Depends on other models	Included in domain analysis	Strong on technical, product and process	Included as part of the Learning and Growth quadrant to assess readiness	Identified throughout all POTI sections	May be part of resource plan
VI. Integrated Architecture Framework	Partial	Partial	Yes	Yes	Partial	No
16. Integration of design between Business and IT – iterative process – takes into account vision, current architecture and design phases	No reference	Considers integration but not specifically design	Considers integration plan but not specifically design	Quadrants inter-relate to provide clear linkages	Blueprint narrative shows current and future state but not the detailed processes	Integration limited to components of work packages within project

Method/ Methodology / Literature Components	ALIGN	Alignment Perspective	Technology Road- mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]	Project Management
17. Specific viewpoints – needs to consider special viewpoints e.g. security	Does provide a perspective on efficiency	Strategic, structural and operational	Incorporates key perspectives	Stakeholders viewpoint intrinsic, other aspects link to Learning and Growth	Limits viewpoints to those included within the Blueprint POTI	Limited to aspects of work packages
VII. Unified Framework	No	Partial	Partial	Yes	Partial	No
18. Process perspective of design – add strategic, structure and operations perspective	Design not considered	Strategic, structural and operational but not specifically process	Considers integration plan but not specifically design	Quadrants inter-relate to provide clear linkages	Considers change plan but not specifically design	Design not considered – objectives are those within scope
VIII. Additional Factors from the writers on alignment	Partial	Partial	Partial	Yes	Partial	Partial
19. Adaptability - not static alignment, capable of	Recognises things need	Capable of repetition	Built on mechanistic	Capable of repetition and change is	Built on current, future state analysis-	Mechanistic and works best in

Method/ Methodology / Literature Components	ALIGN	Alignment Perspective	Technology Road- mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]	Project Management
dealing with changes	to change		principles	measureable	less adaptable	stable conditions
20. Constraints and opportunities – consider human, technological, managerial	Limited reference	Limited reference to Human Factors	Reveals some inter-relationships, stronger on external drivers	Quadrants inter-relate to provide view of constraints	Identified throughout all POTI sections	Considers constraints to the project only
21. Dynamic process	Recognises things need to change	Capable of repetition	Built on mechanistic principles	Capable of repetition and change is measureable	Built on current, future state analysis-slower methodology	Mechanistic and works best in stable conditions
22. Evidence Base	No reference	No reference	Wide application but lacks robust process	Extensive	Extensive	Projects use is well documented
23. Linkage – between strategy and implementation	More focus on alignment aspects	Links through Project resource re-allocation	Used for strategic, program and integration planning	Clear defined links	Through sub-programmes and projects	Only as a mechanism for purpose of delivering business outputs

Method/ Methodology / Literature Components	ALIGN	Alignment Perspective	Technology Road- mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]	Project Management
24. Measurability	Financial – but other models used	Uses gap analysis techniques	Set in time based context but analyses factors rather than measures	Change is measureable	Not implicit within methods	Measures of time and cost (quality is also considered)
IX. Additional Factors from the New Domain writers on alignment	Partial	Partial	Partial	Yes	Partial	No
25. Long term view – constancy of purpose, long term relationship with suppliers	No reference	Considers business position strategically	Shows alignment over streams and over time rather than long term view	Links to Vision and stakeholders perspective	Links to Future state vision	Horizon limited to project scope
26. Customers – attitude to them most important	No reference	Not referenced specifically, links through business strategy	Not referenced specifically, considers external drivers	Key stakeholder	Not referenced specifically	Not referenced specifically
27. Motivation – intrinsic and at all levels	Looks to identify clear and useful	Not specifically referenced	Limited reference to Human Factors	Considers this in Organisational	Not specifically referenced, could be part of	Not referenced specifically

Method/ Methodology / Literature Components	ALIGN	Alignment Perspective	Technology Road- mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]	Project Management
	role			capital	Organisational section	
28. Measurability – against purpose, performance expectations	Financial – but other models used	Uses gap analysis techniques	Set in time based context but analyses factors rather than measures	Change is measureable	Not implicit within methods	Measures of time and cost (quality is also considered)
29. Change process supports emergent approach	Acknow-ledges dynamic environment	Capable of repetition	Built on mechanistic principles, can get out of date quickly	Capable of iterative assessment and measurement	Built on current, future state analysis-less adaptable	Mechanistic and works best in stable conditions
30. Interrelationship of culture, systems, components, organisation, vision, financial, stakeholders, intangible assets	Limited reference	Identifies interrelation-ships and inter-dependencies	Considers integration for products and processes but not specific components unless deconstructed	Covered across the four quadrants	Identified throughout all POTI sections	Limited to aspects within the project scope

Method/ Methodology / Literature Components	ALIGN	Alignment Perspective	Technology Road- mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]	Project Management
31. Continual improvement – reduce variation, improve quality, reduce delays and defects, reduce costs, focus on financial perspective	No reference	Not specifically referenced	Not specifically referenced	Not specifically referenced but could be linked to stakeholder perspective	May appear within narrative as objectives to achieve vision	Not specifically referenced
32. Understand cause and effect	Seeks to identify links	Identifies interrelation-ships and inter-dependencies	Built on mechanistic principles – not specifically iterative	Key benefit of this approach	Projects in support will Identify interrelation-ships and inter-dependencies	Limited to risks and issues within the project scope
33. Training and knowledge-vigorous program of training education and self improvement	No reference	Limited reference to Human Factors	Limited reference to Human Factors	Human Capital and Organisational aspects are considered	Not specifically referenced, could be part of Organisational section	Not specifically referenced
34. Adaptability not static alignment, capable of	Acknow-ledges	Capable of repetition	Built on mechanistic	Capable of repetition and	Built on current, future	Mechanistic and works best in

Method/ Methodology / Literature Components	ALIGN	Alignment Perspective	Technology Road- mapping/ IT Alignment planning	Balanced Scorecard / Strategy Map	Programme Management inc Blueprint [MSP]	Project Management
dealing with change	dynamic environment		principles – not specifically iterative	change is measureable	state analysis- less adaptable	stable conditions
35. Leadership – helping, integrate decisions into work, act on system, improve quality	No reference	Limited reference to Human Factors	Limited reference to Human Factors	Considered climate in Learning Growth Quadrant	Not specifically referenced	Not specifically referenced
36. Identify and design key processes – to support vision, demand, value and flow	No reference	No detailed reference	References process development	Links to process and stakeholder perspectives	May appear within narrative as objectives to achieve vision but not in design	Not specifically referenced
37. Communication – purpose, two way, reduce fear	Looks to communicat e clear and useful role	Communicate via end product graphical inter- pretation	Graphical and time based framework aids communication	Good tool for communication via Strategy Map and other variants available Time based	Written narrative can be produced in summary format with graphics	Graphical status reports on progress to project completion [Gantt charts]

Method/ Methodology / Literature Components	**ALIGN**	**Alignment Perspective**	**Technology Road- mapping/ IT Alignment planning**	**Balanced Scorecard / Strategy Map**	**Programme Management inc Blueprint [MSP]**	**Project Management**
				aspects can be complicated to replicate visually.		
38. Outside in perspective	No reference	No reference	No reference but considers external drivers	Stakeholder perspective key part of approach	No reference	No reference

Table M-2 Comparison of Literature Components with the Methods and Methodologies

Method/ Methodology / Literature Components	**Business Process Re-engineering**	**Theory of Constraints**	**Lean Thinking**	**System Thinking**	**Critical Success Factors**	**Information Systems Development Methodology**
I. BUSINESS STRATEGY	Partial	No	No	Yes	Not Clear	No
1. Business Scope	Not focussed on business direction	Limited to system improvement techniques	Limited to system improvement techniques	Based on demand and customer requirements	Depend upon other models to identify	Only identified if fundamental aspect of the information business model
2. Distinctive Competencies	In extreme form could bring innovation in process	Limited to system improvement techniques	Limited to system improvement techniques	Give the customer their requirements	Can draw on other scenarios which suggest what may be required	Limited to development methodology
3. Business Governance	Limited consideration	Limited to system improvement techniques	Limited to system improvement techniques	Empowers the individual to make decisions	Can draw conclusions on what may be successful	Limited to development methodology

Method/ Methodology / Literature Components	Business Process Re-engineering	Theory of Constraints	Lean Thinking	System Thinking	Critical Success Factors	Information Systems Development Methodology
II. ORGANISATIONAL INFRASTRUCTURE AND PROCESSES	Partial	No	Partial	Yes	Not Clear	Partial
4. Administrative Structure	Limited to consideration of impact on improving process	Limited to system improvement techniques	Limited to system improvement techniques	What the customer needs not what is commanded	This would be difficult to quantify with this method	Limited to management aspects over control
5. Processes	Major strength – primary focus of method	Five step process to improve system being used	Process to improve flow within the system	Assist in absorbing variety and supporting single unifying purpose	Would identify if process was critical to venture through comparisons with similar	Considers process and development required (iterative in Agile forms)
6. Skills	Limited consideration	Limited to system improvement techniques	Limited to system improvement techniques	Does consider what skills are required to support customer needs	Would identify if skills was critical to venture through comparisons	Limited reference to human factors

Method/ Methodology / Literature Components	Business Process Re-engineering	Theory of Constraints	Lean Thinking	System Thinking	Critical Success Factors	Information Systems Development Methodology
					with similar	
III. IT STRATEGY	Partial	No	No	Partial	Not Clear	No
7. Technology Scope	Predominantly looks to leverage the process through technology	Limited to system improvement techniques	Limited to system improvement techniques	Challenges the necessity of technology to underpin all systems	Would identify components critical to venture through comparisons with similar	Limited to system development techniques
8. Systemic Competencies	Focus on process improvement	Limited to system improvement techniques	Limited to system improvement techniques	Competencies must match what gives the customer what matters	Can draw on other scenarios which suggest what may be required	Draws from overall strategy rather than influences
9. IT Governance	Limited consideration	Limited to system improvement techniques	Limited to system improvement techniques	Prioritise to demand	Can draw conclusions on what may be successful	Limited to control over system development

Method/ Methodology / Literature Components	Business Process Re-engineering	Theory of Constraints	Lean Thinking	System Thinking	Critical Success Factors	Information Systems Development Methodology
IV. IT INFRASTRUCTURE AND PROCESSES	Partial	No	No	Yes	Not Clear	Partial
10. Architecture	Focus on what technology required for the new process not pre-existing	Limited to system improvement techniques	Limited to system improvement techniques	Challenges the necessity of technology – what is required for customer matters	Would identify critical aspects to venture through comparisons with similar	Works with identified architecture
11. Processes	Focus on what support process required for the new process not pre-existing	Limited to system improvement techniques in the business	Limited to system flow within the business	Prioritise to support demand	Would identify if process was critical to venture through comparisons with similar	Considers specific IT development methodologies
12. Skills	Limited consideration	Limited to system improvement techniques	Limited to system improvement techniques	Limited to what skills are required to support business system and satisfy	Would identify if skills was critical to venture through comparisons	Identifies required capacity and implicit capability

Method/ Methodology / Literature Components	Business Process Re-engineering	Theory of Constraints	Lean Thinking	System Thinking	Critical Success Factors	Information Systems Development Methodology
				customers	with similar	
V. Generic Framework	Partial	No	Partial	Partial	Not Clear	Partial
13. Information and Infrastructure	Limited to interaction with improved process	Limited to system improvement techniques	Limited to system improvement techniques	Focussed to what information is required to satisfy demand	Would identify critical aspects to venture through comparisons with similar	Structured approach to link information to database and infrastructure
14. Customer Thinking – links internal processes to stakeholder perspective	Seek Improvements in quality, cost, lead-times, outcomes in a competitive world	Limited to system improvement techniques	Links customer expectations to the underlying flow	High focus on customer requirements, process designed to match	Would identify if approach was critical to venture through comparisons with similar	In agile forms works iteratively to link
15. Core Competencies – further emphasis.	Focus on process aspects only	Limited to system improvement techniques	Limited to system improvement techniques	Limited to improvements in the system	Can draw on other scenarios which suggest what may be	Limited to system development methodologies

Method/ Methodology / Literature Components	**Business Process Re-engineering**	**Theory of Constraints**	**Lean Thinking**	**System Thinking**	**Critical Success Factors**	**Information Systems Development Methodology**
					required	
VI. Integrated Architecture Framework	Partial	No	Partial	Partial	Not Clear	Yes
16. Integration of design between Business and IT – iterative process – takes into account vision, current architecture and design phases	Limits to process and business, IT but not specifically vision	Limited to system under review	Limited to improvements in system flow	Limited to those inter-relationships which will satisfy demand	Would only identify if activity was critical to success	Embraces integration of design with business and IT – iteratively within Agile forms
17. Specific viewpoints – needs to consider special viewpoints e.g. security	Limited to improving process	Limited to system under review	Focus on customers view point	Focus remains on the system and demand	Would only identify if activity was critical to success	Contained where required for the solution
VII. Unified Framework	Partial	Partial	Partial	No	Not Clear	Yes
18. Process perspective of design – add strategic, structure and operations	Limited to improvements	Limited to system under	Limited to improvements in	Challenges command and control – what	Would only identify if activity was	Methodology considers requirements of

Method/ Methodology / Literature Components	Business Process Re-engineering	Theory of Constraints	Lean Thinking	System Thinking	Critical Success Factors	Information Systems Development Methodology
perspective	in process	review	system flow	matters to customer	critical to success	the process – iteratively in Agile forms
VIII. Additional Factors from the writers on alignment	Partial	Partial	Partial	Partial	Not Clear	Partial
19. Adaptability - not static alignment, capable of dealing with changes	Limited to improve-ments in process, sustainability is an issue	Limited to system under review	Limited to improvements in system flow	Adapts to demand as it changes	Can be re-aligned when evidence presented	Agile forms are particularly suited to this environment
20. Constraints and opportunities – consider human, technological, managerial	Focus on opportunities of radical improvement to process	Limited to system improvement techniques particularly system constraints	Limited to constraints to the system flow	Challenges status quo in terms of technological approaches	Would only identify if activity was critical to success	Limited to development methodologies
21. Dynamic process	Initial change is radical, marginal can be	Limited to system under	Limited to improvements in	Adapts to demand as it	Tends to work better over stable	Agile forms are particularly suited to this

Method/ Methodology / Literature Components	Business Process Re-engineering	Theory of Constraints	Lean Thinking	System Thinking	Critical Success Factors	Information Systems Development Methodology
	improved later	review	system flow	changes	environment	environment
22. Evidence Base	Low examples of success in private sector, credit given to other methods	Some publications exist to support evidence base	Base on work of Toyota and Deming which is well published	Work limited in public sector but some publications quote evidence	Based on academic principles	1000's of variants but limited evidence base
23. Linkage – between strategy and implementation	Limited link	Limited to system improvement techniques	Limited to improvements in system flow	Limited link	Links the components which will make the linkages	Agile forms are particularly suited to link with implementation
24. Measurability	Process improvements can be measured	Limited to measures around system performance	Limited to measurements of improvement in system flow	Measures around relevant factors e.g. waiting times	Not a measurement tool – identifies required outcomes	Methodologies if used can provide clear position for managers
IX. Additional Factors from the New Domain writers on alignment	Partial	Partial	Partial		No	Partial

Method/ Methodology / Literature Components	Business Process Re-engineering	Theory of Constraints	Lean Thinking	System Thinking	Critical Success Factors	Information Systems Development Methodology
25. Long term view – constancy of purpose, long term relationship with suppliers	Limited to process but can have longer term consequences – e.g. integrated process with supplier	Limited to system improvement techniques	Limited to improvements in system flow	Focus remains on system under review	Would only identify if activity was critical to success	Focus on delivering development package
26. Customers – attitude to them most important	Seek Improvements in quality, cost, lead-times, outcomes	Limited to system improvement techniques	Links customer expectations to the underlying flow	High visibility of demand and what matters	Would identify if approach was critical to venture through comparisons with similar	Agile forms are particularly suited to this
27. Motivation – intrinsic and at all levels	Radical change is not based around individuals motivation	Limited to system improvement techniques although some references to empowerment	Moves decision making into the front line	Aids decisions but in an empowered way	Would only identify if activity was critical to success	Experienced programmers do not welcome this approach

Method/ Methodology / Literature Components	**Business Process Re-engineering**	**Theory of Constraints**	**Lean Thinking**	**System Thinking**	**Critical Success Factors**	**Information Systems Development Methodology**
28. Measurability – against purpose, performance expectations	Process improvements can be measured	Limited to measures around system performance	Limited to measurements of improvement in system flow	Measures around relevant factors e.g. waiting times	Not a measurement tool – identifies required outcomes	Methodologies if used can provide clear position for managers
29. Change process supports emergent approach	Uses radical transformation	Review can be repeated	Limited to improvements in system flow	Adapts to demand as it changes	Tends to work better over stable environment	Agile forms are particularly suited to this
30. Interrelationship of culture, systems, components, organisation, vision, financial, stakeholders, intangible assets	Limited to process, information, technology and reduced costs	Limited to system under review	Limited to those aspects which improve the system flow	Focuses on the inter-relationship between various parts of the organisation	Would only identify if component was critical to success, limited evidence around multi-variable CSF's	Culture of organisation has big impact upon use of methodology
31. Continual improvement – reduce variation, improve quality, reduce delays and defects, reduce costs, focus on financial	Radical implementation is to cover all aspects for foreseeable	Fundamental part of the methodology	Fundamental element of improving system flow and adding customer	System improvement for customer benefit	Not an improvement tool, would identify elements which	Supports early identification of requirements and necessary improvements

Method/ Methodology / Literature Components	Business Process Re-engineering	Theory of Constraints	Lean Thinking	System Thinking	Critical Success Factors	Information Systems Development Methodology
perspective	future		value		needed to succeed only	to development process
32. Understand cause and effect	Limited to considerations in design of process	Links to system under review	Limited to improvements in system flow	Relevant to understanding demand and service response	Not a causation or association tool	Agile forms has element of this in support of requirements
33. Training and knowledge-vigorous program of training education and self improvement	Limited as the solution is usually an imposed one	Limited to some references to empowerment	Acknowledgement that experience and training is important	Limited toolkits or training courses, more action learning approach	Would only identify if component was critical to success	Limited to use for beginners. Experienced practitioners do not embrace others past experiences
34. Adaptability not static alignment, capable of dealing with change	Radical implementation is to cover all aspects for foreseeable	Constraints move around the system and requires change	Limited to improvements in system flow	Adapts to demand as it changes	Tends to work better over stable environment	Agile forms are particularly suited to this

Method/ Methodology / Literature Components	**Business Process Re-engineering**	**Theory of Constraints**	**Lean Thinking**	**System Thinking**	**Critical Success Factors**	**Information Systems Development Methodology**
	future					
35. Leadership – helping, integrate decisions into work, act on system, improve quality	Radically improved process is the major driver	Some references but not major contribution	Change of relationship to empower employees	Aids decisions but in an empowered way	Would only identify if leadership was critical to success	Does not support this in overall methodologies whereas Agile forms can embrace this aspect
36. Identify and design key processes – to support vision, demand, value and flow	Focus on lead times, cost reduction and outcomes utilising innovation	Review of system design is a fundamental part of the methodology	Design of systems to improve customer value through improved flow	Focus remains on link between demand and system design	Would identify if process was critical to venture through comparisons with similar	Identification of process requirement is a fundamental part of the methodology
37. Communication – purpose, two way, reduce fear	Has a reputation in the public sector as an imposed method,	Focuses attention to aid debate	Focus of debate upon value in the system flow	Assists in understanding demand, responses and improvements	Not a communication tool	Can create tensions within managerial/ developer relationship.

Method/ Methodology / Literature Components	Business Process Re-engineering	Theory of Constraints	Lean Thinking	System Thinking	Critical Success Factors	Information Systems Development Methodology
	evidence of resistance			for customers		
38. Outside in perspective	No reference	No reference	Links customer expectations to the underlying flow	High focus on what customer requires	No perspective	Agile forms can facilitate this aspect

Appendix N: Mapping the Alignment Components to the PSSAM Perspective Stage One

Table N-1 Mapping the Alignment Components to the PSSAM Perspective Stage One Original

FR Perspective		Component Source	Component Aspect	Narrative
Vision		Integrated Architecture Framework (VI)	Integrated Design (16)	Iterative process which references vision in design phases
		Enablers and Inhibitors	SIM Survey (50)	Business units' lack of understanding of the firm's business Lack of clarity and predictability of corporate goals and directions
Financial Perspective		Service Strategy (I)	Service scope(1)	Performance targets = influencing efficiency and effectiveness
		Organisational Infrastructure and Processes (II)	Processes(4)	Identify direct and indirect benefits
		IT Strategy (III)	IT Governance (9)	Financial Thresholds Governance Structure Documentation complexity and robustness
		IT Strategy (III)	IT Governance (9)	Risk management

FR Perspective		Component Source	Component Aspect	Narrative
		Additional Factors from the New Domain writers on alignment (IX)	Long Term View (25)	Constancy of purpose
		Enablers and Inhibitors	SIM Survey (53)	Business units competing for IT resources rather than sharing
		Enablers and Inhibitors (X)	Case Study (67-70, 80)	Three E's: economy, effectiveness, efficiency Governance and assurance requirements, resource prioritisation Freedom to act – light governance to promote empowerment Financial instruments (SO's, SFI's, Procurement rules) Acceptance of risk balanced with innovation
Stakeholder/ Customer Perspective		Service Strategy (I)	Service Scope(1)	Expectations of citizen and stakeholder – including effect of social trends (e.g. access via mobile device)
			Service Governance	Delivery point of service to meet

FR Perspective		Component Source	Component Aspect	Narrative
			(3)	stakeholder interactions
		Service Strategy (I)	Distinctive Competencies and Constraints (2)	Standards of Service, responses to new initiatives
		Service Strategy (I)	Service Governance (3)	Stakeholder identification
		Service Strategy (I)	Service Governance (3)	Governmental and European Regulations
		Organisational Infrastructure and Processes (II)	Organisational Structure and Responsibilities (4)	Required transitions of organisational boundaries
		Organisational Infrastructure and Processes (II)	Processes (5)	Amount of acceptable customer interaction in process
		IT Strategy (III)	Technology Scope (7)	Expectations of Suppliers
		IT Strategy (III)	IT Governance (9)	Committee structures Organisational structure of control and management of project(s)
		Generic Framework (V)	Customer Thinking (14)	Link internal processes to customer orientated thinking
		Integrated Architecture	Specific Viewpoints	Consider specific viewpoints [usability and

FR Perspective		Component Source	Component Aspect	Narrative
		Framework (VI)	(17)	access for stakeholders]
		Additional Factors from the New Domain writers on alignment (IX)	Long Term View (25)	Constancy of purpose Long term relationship with suppliers
		Additional Factors from the New Domain writers on alignment (IX)	Customers (26)	Attitude to customers most important
		Additional Factors from the New Domain writers on alignment (IX)	Leadership (35)	Helping, integrate decisions into work, act on system, improve quality
		Additional Factors from the New Domain writers on alignment (IX)	Communication (37)	Purpose, two way
		Additional Factors from the New Domain writers on alignment (IX)	Outside in perspective (38)	
		Enablers and Inhibitors	SIM Survey	Enablers being: - Senior executive support for IT - IT understands the firm's business environment - Close partnership between IT and business - IT and business personnel have close

FR Perspective		Component Source	Component Aspect	Narrative
				personal relationships
			SIM Survey	Inhibitors being: - Lack of senior executive support for IT - Business units' lack of support for corporate-wide IT initiatives - Resistance from senior executives
		Enablers and Inhibitors	Case Study (55,56)	Understand future plans, actions and expectations of Welsh Government; devolved Health Boards; Executives and Non Officer Members of those Health Boards; and managers and staff delivering the service. Interactions from shared patient experiences
Key Process Perspective		Service Strategy (I)	Service Scope (1)	Timely and state of art services to citizen and stakeholders
		Organisational Infrastructure and Processes (II)	Processes (5)	Identify Core Processes Clinically Flow, Value added opportunities, workflow improvements Balanced approach to benefits [between performance and operations) Agreed national or local processes

FR Perspective		Component Source	Component Aspect	Narrative
				employed
			Organisational Structure and Responsibilities (4)	Delivery of organisational boundary transitions
		IT Strategy (III)	Technology Scope (7)	Derived Information
		IT Infrastructure And Processes (IV)	Processes (11)	Practices and techniques used to request, develop, maintain applications and infrastructure Enablement links to organisational processes
		Generic Framework (V)	Information and Infrastructure (13)	business processes must link to IT processes
		Generic Framework (V)	Customer Thinking (14)	Link internal processes to customer orientated thinking
		Integrated Architecture Framework (VI)	Integrated Design (16)	Iterative design process – references vision, architecture
		Unified Framework (VII)	Process Perspective of Design (18)	Strategic, structure and operations perspective in design
		Additional Factors from the New Domain writers on alignment (IX)	Interrelationship (30)	Interrelationship of systems, components, organisation

FR Perspective		Component Source	Component Aspect	Narrative
		Additional Factors from the New Domain writers on alignment (IX)	Continual Improvement (31)	Reduce variation, improve quality, reduce delays and defects
		Additional Factors from the New Domain writers on alignment (IX)	Leadership (35)	Helping, integrate decisions into work, act on system, improve quality
		Additional Factors from the New Domain writers on alignment (IX)	Design (36)	Design to support demand, value and flow
		Enablers and Inhibitors	SIM Survey (44,46,47,54)	- Good communications between the IT organization and the business - IT organization meets commitments - IT organization involved in business strategy development - Business communication with IT
		Enablers and Inhibitors	Case Study (57-59,61,63)	Building relationships to understand business, plans, knowledge, constraints, partnership working High and multiple levels of communication Develop within a whole system context Developers use iterative process close to the prospective users using experienced

FR Perspective		Component Source	Component Aspect	Narrative
				business personnel to reduce issues through quality assurance, improve testing, and ultimately deliver benefits Run a well planned, timely development and ensure a quick transition
Learning and Growth				
Human Resource Capital		Service Strategy (I)	Distinctive Competencies and Constraints (2)	Capacity and Capability (competence)
		Organisational Infrastructure and Processes (II)	Skills (6)	Culture – will to succeed Leadership impact Range of education and life skills Match to requirements for customer interactions (see capacity capability)
		IT Infrastructure And Processes (IV)	Skills (12)	Leadership Impact Range of educational and skills (inc Life Skills) Match to requirements (see capacity capability)
		Generic Framework (V)	Core Competencies	Core competencies – human resources

FR Perspective		Component Source	Component Aspect	Narrative
			(15)	
		Additional factors from the writers on alignment (VIII)	Constraints and opportunities (20)	Consider HR constraints and opportunities
		Additional Factors from the New Domain writers on alignment (IX)	Motivation (27)	Intrinsic motivation at all levels
		Additional Factors from the New Domain writers on alignment (IX)	Training and Knowledge (33)	Vigorous programme of training, education and self-improvement
		Additional Factors from the New Domain writers on alignment (IX)	Leadership (35)	Helping, integrate decisions into work, act on system, improve quality
		Additional Factors from the New Domain writers on alignment (IX)	Communication (37)	Purpose, two way, reduce fear
		Additional Factors from the New Domain writers on alignment (IX)	Outside in perspective (38)	
		Enablers and Inhibitors	SIM Survey (45)	- IT organization demonstrated strong leadership

FR Perspective		Component Source	Component Aspect	Narrative
		Enablers and Inhibitors	Case Study (62,64-66,81)	Create shared languages between developers and business personnel Leadership at vision, political, resource, technological, implementation and support dimensions Ownership of vision supported by good relationships, freedom to act, empowerment, trust and professionalism Good knowledge base over business, its workflows and processes, improvement methodologies and analysis, role of technology in future High level of technical comprehension
Information Capital		Service Strategy (I)	Distinctive Competencies and Constraints (2)	Capacity and Capability (competence) Level of outsourcing (to promote flexibility)
		Organisational Infrastructure and Processes (II)	Organisational Structure and Responsibilities (4)	Capacity and capability to deliver transitions, mergers and consolidation of organisations
		IT Strategy (III)	Technology Scope (7)	Important applications and technologies Bespoke departmental applications- links to equipment and devices

FR Perspective		Component Source	Component Aspect	Narrative
				Derived information Integration and workflow requirements across organisation
		IT Strategy (III)	Technology Scope (7)	Capabilities (to inter act with stakeholders/citizens) Capabilities (to support internal customers/stakeholders) Capabilities of suppliers Capacity, capability, functionality, robustness of solutions
		IT Infrastructure And Processes (IV)	Architecture (10)	Where on maturity scale being: Enterprise solution <–> multiple integrated solutions Important infrastructure approaches Bespoke departmental, links to equipment and devices Derived information Integration requirements across the organisation
		Generic Framework (V)	Information and Infrastructure	Infrastructure architecture Strategic Integration - Link between IT

FR Perspective		Component Source	Component Aspect	Narrative
				strategy and IT Processes Functional integration – business strategy must link with IT strategy, business processes must link to IT processes
		Integrated Architecture Framework (VI)	Integrated Design (16)	Iterative design process – references processes, vision
		Integrated Architecture Framework (VI)	Specific Viewpoints (17)	Consider relevant aspects (e.g security)
		Additional factors from the writers on alignment (VIII)	Constraints and opportunities (20)	Consider technological constraints and opportunities
		Additional Factors from the New Domain writers on alignment (IX)	Interrelationship (30)	Interrelationship of systems, components, organisation
			SIM Survey (43	IT plans linked to business plans
		Enablers and Inhibitors	Case Study (60,64,71-75,82-83)	Create workflows which are standard, have limited variation, and are linked to IT and information infrastructure Leadership responsibility rests for technical and support dimensions Maturity of the IT Department and the infrastructure

FR Perspective		Component Source	Component Aspect	Narrative
				Robustness and resilience of supported solutions Data quality of existing collection and presentation methods Maturity of integration between systems, message exchange Capacity and capability to introduce change Fit for purpose solutions is paramount to successful acceptance, deployment and continued use (fades to background test) Status of any supplier, ability to deliver over a long period of time in a consistent manner.
Organisational Capital		Service Strategy (I)	Service Scope (1)	Geographical areas
		Service Strategy (I)	Service Governance (3)	Structures, oversight committees
		Organisational Infrastructure and Processes (II)	Organisational Structure and Responsibilities (4)	Transition State of organisation, Boundary of service provision, professional or organisational autonomy, structure and responsibility of management tiers
		IT Strategy (III)	IT Governance (9)	Management of ICT, conflicting or

FR Perspective		Component Source	Component Aspect	Narrative
				complementary responsibilities Delegated authority Organisational structure of control and management of project(s) Risk management
		Additional factors from the writers on alignment (VIII)	Constraints and opportunities (20)	Consider managerial constraints and opportunities
		Additional Factors from the New Domain writers on alignment (IX)	Interrelationship (30)	Interrelationship of systems, components, organisation
		Additional Factors from the New Domain writers on alignment (IX)	Communication (37)	Purpose, two way, reduce fear
		Enablers and Inhibitors	SIM Survey (48)	- Clear ownership of IT-business alignment
		Enablers and Inhibitors	Case Study (64)	- Responsibility at vision, design and development level
External				

FR Perspective		Component Source	Component Aspect	Narrative
Political		Service Strategy (I)	Service Governance (3)	Governmental and European Regulations – ethics, green agenda, equality. Environment, safety
		Enabler and Inhibitors	Case Study (76)	Political direction including National drivers and initiatives (e.g. ICT) Policy making and priorities Governance requirements Levels of assurance
Economic		Enabler and Inhibitors	Case Study (77)	State of supplier market place Monopoly suppliers Takeover and mergers (consolidations)
Social		Enabler and Inhibitors	Case Study 78)	Changes in the use and deployment of technology in society Changes in service, equipment or appliances required
		Service Strategy (I)	Service Scope(1)	Expectations of citizen and stakeholder – including effect of social trends (e.g. access via mobile device)

FR Perspective		Component Source	Component Aspect	Narrative
Technology		Generic Framework (V)	Information and Infrastructure (13)	External perspective required
		Enabler and Inhibitors	Case Study (79)	Changes in the use and deployment of technology in business environment
Characteristics		Organisational Infrastructure and Processes (II)	Processes (5)	Pre and post measurements of improvements
		Additional factors from the writers on alignment (VIII)	Adaptability (19)	
			Dynamic Process (21)	
			Evidence Base (22)	
			Linkage (23)	Linkage between strategy and implementation
			Measurability (24)	
		Additional Factors from the New Domain writers on alignment (IX)	Measurability (28)	
		Additional Factors from the New Domain writers on alignment (IX)	Change process supports emergent approach (29)	

FR Perspective		Component Source	Component Aspect	Narrative
		Additional Factors from the New Domain writers on alignment (IX)	Understand Cause and effect (32)	
		Additional Factors from the New Domain writers on alignment (IX)	Adaptability (34)	Not static alignment Capable of dealing with change
		Additional Factors from the New Domain writers on alignment (IX)	Outside in perspective (38)	

Appendix O: Mapping the Alignment Components to the PSSAM Perspective Stage One – Revision Two

Table O-1 Mapping the Alignment Components to the PSSAM Perspective Stage One Revision 2

Area		Component	Source	Elements	Enablers and Inhibitors
Vision		Integrated Design (16)	Integrated Architecture Framework (VI)	Iterative process which references vision in design phases	SIM Survey (50) Business units' lack of understanding of the firm's business Lack of clarity and predictability of corporate goals and directions
Financial Perspective		Service scope(1)	Service Strategy (I)	Performance targets = influencing efficiency and effectiveness	SIM Survey (53) Business units competing for IT resources rather than sharing
		Processes(4)	Organisational Infrastructure and Processes (II)	Identify direct and indirect benefits	
		IT Governance (9)	IT Strategy (III)	Financial Thresholds	

Area		Component	Source	Elements	Enablers and Inhibitors
				Governance Structure Documentation complexity and robustness	Case Study (67-70, 80) Three E's: economy, effectiveness, efficiency
		IT Governance (9)	IT Strategy (III)	Risk management	Governance and assurance requirements, resource prioritisation
		Long Term View (25)	Additional Factors from the New Domain writers on alignment (IX)	Constancy of purpose	Freedom to act – light governance to promote empowerment Financial instruments (SO's, SFI's, Procurement rules) Acceptance of risk balanced with innovation
Stakeholder/ Customer Perspective		Service Scope(1)	Service Strategy (I)	Expectations of citizen and stakeholder – including effect of social trends (e.g. access via mobile device)	SIM Survey Enablers being: Senior executive

Area		Component	Source	Elements	Enablers and Inhibitors
		Service Governance (3)		Delivery point of service to meet stakeholder interactions	support for IT IT understands the firm's business environment Close partnership between IT and business IT and business personnel have close personal relationships -
		Distinctive Competencies and Constraints (2)	Service Strategy (I)	Standards of Service, responses to new initiatives	
		Service Governance (3)	Service Strategy (I)	Stakeholder identification	
		Service Governance (3)	Service Strategy (I)	Governmental and European Regulations	
		Organisational Structure and Responsibilities (4)	Organisational Infrastructure and Processes (II)	Required transitions of organisational boundaries	Inhibitors being: Lack of senior executive support for IT Business units' lack of support for corporate-wide IT initiatives Resistance from senior executives
		Processes (5)	Organisational Infrastructure and Processes (II)	Amount of acceptable customer interaction in process	
		Technology Scope (7)	IT Strategy (III)	Expectations of Suppliers	
		IT Governance (9)	IT Strategy (III)	Committee structures Organisational structure of control and management of project(s)	Case Study (55,56) Understand future plans, actions and expectations of Welsh Government; devolved Health Boards;
		Customer Thinking (14)	Generic Framework (V)	Link internal processes to customer orientated thinking	

Area		Component	Source	Elements	Enablers and Inhibitors
		Specific Viewpoints (17)	Integrated Architecture Framework (VI)	Consider specific viewpoints [usability and access for stakeholders]	Executives and Non Officer Members of those Health Boards; and managers and staff delivering the service. Interactions from shared patient experiences
		Long Term View (25)	Additional Factors from the New Domain writers on alignment (IX)	Constancy of purpose Long term relationship with suppliers	
		Customers (26)	Additional Factors from the New Domain writers on alignment (IX)	Attitude to customers most important	
		Leadership (35)	Additional Factors from the New Domain writers on alignment (IX)	Helping, integrate decisions into work, act on system, improve quality	
		Communication (37)	Additional Factors from the New Domain writers on alignment (IX)	Purpose, two way	
		Outside in perspective (38)	Additional Factors from the New Domain writers on alignment (IX)		

Area		Component	Source	Elements	Enablers and Inhibitors
Key Process Perspective		Service Scope (1)	Service Strategy (I)	Timely and state of art services to citizen and stakeholders	SIM Survey (44,46,47,54)
		Processes (5)	Organisational Infrastructure and Processes (II)	Identify Core Processes Clinically Flow, Value added opportunities, workflow improvements Balanced approach to benefits [between performance and operations) Agreed national or local processes employed	Good communications between the IT organization and the business IT organization meets commitments IT organization involved in business strategy development Business communication with IT
		Organisational Structure and Responsibilities (4)		Delivery of organisational boundary transitions	
		Technology Scope (7)	IT Strategy (III)	Derived Information	Case Study (57-59,61,63)
		Processes (11)	IT Infrastructure And Processes (IV)	Practices and techniques used to request, develop, maintain applications and infrastructure	Building relationships to understand business, plans, knowledge,

Area		Component	Source	Elements	Enablers and Inhibitors
				Enablement links to organisational processes	constraints, partnership working
		Information and Infrastructure (13)	Generic Framework (V)	business processes must link to IT processes	High and multiple levels of communication
		Customer Thinking (14)	Generic Framework (V)	Link internal processes to customer orientated thinking	Develop within a whole system context
		Integrated Design (16)	Integrated Architecture Framework (VI)	Iterative design process – references vision, architecture	Developers use iterative process close to the prospective users using experienced business personnel to reduce issues through quality assurance, improve testing, and ultimately deliver benefits
		Process Perspective of Design (18)	Unified Framework (VII)	Strategic, structure and operations perspective in design	
		Interrelationship (30)	Additional Factors from the New Domain writers on alignment (IX)	Interrelationship of systems, components, organisation	Run a well planned, timely development and ensure a quick transition
		Continual Improvement (31)	Additional Factors from the New Domain writers on alignment (IX)	Reduce variation, improve quality, reduce delays and defects	
		Leadership (35)	Additional Factors from the New Domain writers on	Helping, integrate decisions into work, act on system, improve quality	

Area		Component	Source	Elements	Enablers and Inhibitors
			alignment (IX)		
		Design (36)	Additional Factors from the New Domain writers on alignment (IX)	Design to support demand, value and flow	
Learning and Growth					
Human Resource Capital		Distinctive Competencies and Constraints (2)	Service Strategy (I)	Capacity and Capability (competence)	SIM Survey (45) IT organization demonstrated strong leadership
		Skills (6)	Organisational Infrastructure and Processes (II)	Culture – will to succeed Leadership impact Range of education and life skills Match to requirements for customer interactions (see capacity capability)	Case Study (62 64,66,81) Create shared languages between developers and business personnel
		Skills (12)	IT Infrastructure And Processes (IV)	Leadership Impact Range of educational and skills	Leadership at vision, political, resource, technological,

Area		Component	Source	Elements	Enablers and Inhibitors
				(inc Life Skills) Match to requirements (see capacity capability)	implementation and support dimensions Ownership of vision supported by good relationships, freedom to act, empowerment, trust and professionalism Good knowledge base over business, its workflows and processes, improvement methodologies and analysis, role of technology in future High level of technical comprehension
		Core Competencies (15)	Generic Framework (V)	Core competencies – human resources	
		Constraints and opportunities (20)	Additional factors from the writers on alignment (VIII)	Consider HR constraints and opportunities	
		Motivation (27)	Additional Factors from the New Domain writers on alignment (IX)	Intrinsic motivation at all levels	
		Training and Knowledge (33)	Additional Factors from the New Domain writers on alignment (IX)	Vigorous programme of training, education and self-improvement	
		Leadership (35)	Additional Factors from the New Domain writers on alignment (IX)	Helping, integrate decisions into work, act on system, improve quality	
		Communication (37)	Additional Factors from the New Domain writers on	Purpose, two way, reduce fear	

Area		Component	Source	Elements	Enablers and Inhibitors
			alignment (IX)		
		Outside in perspective (38)	Additional Factors from the New Domain writers on alignment (IX)		
Information Capital		Distinctive Competencies and Constraints (2)	Service Strategy (I)	Capacity and Capability (competence) Level of outsourcing (to promote flexibility)	SIM Survey (43) IT plans linked to business plans
		Organisational Structure and Responsibilities (4)	Organisational Infrastructure and Processes (II)	Capacity and capability to deliver transitions, mergers and consolidation of organisations	Case Study (60,64,71-75,82-83)
		Technology Scope (7)	IT Strategy (III)	Important applications and technologies Bespoke departmental applications- links to equipment and devices Derived information Integration and workflow	Create workflows which are standard, have limited variation, and are linked to IT and information infrastructure Leadership responsibility rests for technical and

Area		Component	Source	Elements	Enablers and Inhibitors
				requirements across organisation	support dimensions
		Technology Scope (7)	IT Strategy (III)	Capabilities (to inter act with stakeholders/citizens) Capabilities (to support internal customers/stakeholders) Capabilities of suppliers Capacity, capability, functionality, robustness of solutions	Maturity of the IT Department and the infrastructure Robustness and resilience of supported solutions Data quality of existing collection and presentation methods
		Architecture (10)	IT Infrastructure And Processes (IV)	Where on maturity scale being: Enterprise solution <–> multiple integrated solutions Important infrastructure approaches Bespoke departmental, links to equipment and devices Derived information Integration requirements across the organisation	Maturity of integration between systems, message exchange Capacity and capability to introduce change Fit for purpose solutions is paramount to successful acceptance, deployment and continued use (fades to background test)
		Information and Infrastructure	Generic Framework (V)	Infrastructure architecture Strategic Integration - Link	Status of any supplier, ability to deliver over a long period of time in a

Area		Component	Source	Elements	Enablers and Inhibitors
				between IT strategy and IT Processes Functional integration – business strategy must link with IT strategy, business processes must link to IT processes	consistent manner.
		Integrated Design (16)	Integrated Architecture Framework (VI)	Iterative design process – references processes, vision	
		Specific Viewpoints (17)	Integrated Architecture Framework (VI)	Consider relevant aspects (e.g security)	
		Constraints and opportunities (20)	Additional factors from the writers on alignment (VIII)	Consider technological constraints and opportunities	
		Interrelationship (30)	Additional Factors from the New Domain writers on alignment (IX)	Interrelationship of systems, components, organisation	

Area		Component	Source	Elements	Enablers and Inhibitors
Organisational Capital		Service Scope (1)	Service Strategy (I)	Geographical areas	SIM Survey (48) Clear ownership of IT-business alignment
		Service Governance (3)	Service Strategy (I)	Structures, oversight committees	
		Organisational Structure and Responsibilities (4)	Organisational Infrastructure and Processes (II)	Transition State of organisation, Boundary of service provision, professional or organisational autonomy, structure and responsibility of management tiers	Case Study (64) Responsibility at vision, design and development level
		IT Governance (9)	IT Strategy (III)	Management of ICT, conflicting or complementary responsibilities Delegated authority Organisational structure of control and management of project(s) Risk management	
		Constraints and opportunities (20)	Additional factors from the writers on alignment (VIII)	Consider managerial constraints and opportunities	
		Interrelationship (30)	Additional Factors from the New Domain writers on	Interrelationship of systems, components, organisation	

Area		Component	Source	Elements	Enablers and Inhibitors
			alignment (IX)		
		Communication (37)	Additional Factors from the New Domain writers on alignment (IX)	Purpose, two way, reduce fear	
External					
Political		Service Governance (3)	Service Strategy (I)	Governmental and European Regulations – ethics, green agenda, equality. Environment, safety	Case Study (76) Political direction including National drivers and initiatives (e.g. ICT) Policy making and priorities Governance requirements Levels of assurance
Economic					Case Study (77)

Area		Component	Source	Elements	Enablers and Inhibitors
					State of supplier market place Monopoly suppliers Takeover and mergers (consolidations)
Social		Service Scope(1)	Service Strategy (I)	Expectations of citizen and stakeholder – including effect of social trends (e.g. access via mobile device)	Case Study (78) Changes in the use and deployment of technology in society Changes in service, equipment or appliances required
Technology		Information and Infrastructure (13)	Generic Framework (V)	External perspective required	Case Study (79) Changes in the use and deployment of technology in business environment
Characteristics		Processes (5)	Organisational Infrastructure and	Pre and post measurements of improvements	

Area		Component	Source	Elements	Enablers and Inhibitors
			Processes (II)		
		Adaptability (19)	Additional factors from the writers on alignment (VIII)		
		Dynamic Process (21)			
		Evidence Base (22)			
		Linkage (23)		Linkage between strategy and implementation	
		Measurability (24)			
		Measurability (28)	Additional Factors from the New Domain writers on alignment (IX)		
		Change process supports emergent approach (29)	Additional Factors from the New Domain writers on alignment (IX)		
		Understand Cause and effect (32)	Additional Factors from the New Domain writers on alignment (IX)		

Area		Component	Source	Elements	Enablers and Inhibitors
		Adaptability (34)	Additional Factors from the New Domain writers on alignment (IX)	Not static alignment Capable of dealing with change	
		Outside in perspective (38)	Additional Factors from the New Domain writers on alignment (IX)		

This concludes the mapping iterations.

Appendix P - Mapping the Alignment Components to the PSSAM Perspective Literature

Table P-1 PSSAM Component Literature Source

Perspective	Aspect	Literature Reference	Enablers and Inhibitors Reference
Financial Perspective			
	Service scope(1)	Luftman (1996), Skaggs and Huffman (2003)	SIM Survey (53) Luftman and Kempaiah (2008)
	Processes(4)	Luftman (1996)	
	IT Governance (9)	Luftman (1996)	
	Long Term View (25)	Deming (1996), Seddon (2005)	Case Study (67-70, 80)
Perspective	**Aspect**	**Literature Reference**	**Enablers and Inhibitors Reference**
Stakeholder / Customer Perspective			
	Service Scope(1)	Luftman (1996), Skaggs and Huffman (2003)	SIM Survey Luftman and Kempaiah (2008)
	Service Governance (3)	Luftman (1996)	
	Distinctive Competencies and Constraints (2)	Luftman (1996)	Case Study (55,56)
	Organisational Structure and	Luftman (1996)	

	Responsibilities (4)		
	Processes (5)	Luftman (1996)	
	Technology Scope (7)	Luftman (1996)	
	IT Governance (9)	Luftman (1996)	
	Customer Thinking (14)	Maes et al. (2000)	
	Specific Viewpoints (17)	IAF- Cap Gemini - Maes et al. (2000)	
	Long Term View (25)	Deming (1996), Seddon (2005)	
	Leadership (35)	Deming (1996), Neave (1990), Radnor and Walley (2008)	
	Communication (37)	Deming (1996)	
	Outside in perspective (38)	Seddon (2005)	
Perspective	**Aspect**	**Literature Reference**	**Enablers and Inhibitors Reference**
Key Process Perspective			
	Service Scope (1)	Luftman (1996), Skaggs and Huffman (2003)	SIM Survey (44,46,47,54)
	Processes (5)	Luftman (1996)	
	Organisational Structure and Responsibilities (4)	Luftman (1996)	Luftman and Kempaiah (2008)
	Technology Scope (7)	Luftman (1996)	Case Study (57-59,61,63)

	Processes (11)	Luftman (1996)	
	Information and Infrastructure (13)	Maes et al. (2000)	
	Customer Thinking (14)	Maes et al. (2000)	
	Integrated Design (16)	IAF- Cap Gemini - Maes et al. (2000)	
	Process Perspective of Design (18)	UF- Maes et al. (2000)	
	Interrelationship (30)	Deming (1996), Seddon (2005), Hillmer and Kaney (1997)	
	Continual Improvement (31)	Deming (1996), Neave (1990), Zokaei et al. (2010), Radnor and Walley (2008)	
	Leadership (35)	Deming (1996), Neave (1990), Radnor and Walley (2008)	
	Design (36)	Seddon (2005), Kaplan and Norton (2004,2008)	
Perspective	**Aspect**	**Literature Reference**	**Enablers and Inhibitors Reference**
Learning and Growth			
Human Resource Capital			
	Distinctive Competencies and Constraints (2)	Luftman (1996)	SIM Survey (45) Luftman and Kempaiah (2008)
	Skills (6)	Luftman (1996)	

	Core Competencies (15)	Maes et al. (2000)	Case Study (62,64-66,81)
	Constraints and opportunities (20)	Maes et al. (2000), Mintzberg (1987)	
	Motivation (27)	Deming (1996), Neave (1990), Seddon (2005), Jackson (2003)	
	Training and Knowledge (33)	Deming (1996), Neave (1990), Kaplan and Norton (2004,2008), McNulty and Ferlie (2004)	
	Leadership (35)	Deming (1996), Neave (1990), Radnor and Walley (2008)	
	Communication (37)	Deming (1996)	
	Outside in perspective (38)	Seddon (2005)	
Information Capital			
	Distinctive Competencies and Constraints (2)	Luftman (1996), Quinn et al.(1989)	SIM Survey (43) Luftman and Kempaiah (2008)
	Organisational Structure and Responsibilities (4)	Luftman (1996)	Case Study (60,64,71-75,82-83)
	Technology Scope (7)	Luftman (1996)	
	Architecture (10)	Luftman (1996)	
	Information and Infrastructure (13)	Maes et al. (2000)	
	Integrated Design	IAF- Cap Gemini -	

	(16)	Maes et al. (2000)	
	Specific Viewpoints (17)	IAF- Cap Gemini - Maes et al. (2000)	
	Constraints and opportunities (20)	Maes et al. (2000), Mintzberg (1987)	
	Interrelationship (30)	Deming (1993), Hillmer and Karney (1997), Seddon (2005), McNulty and Ferlie (2004), Bhatia and Drew (2006), Goldratt and Cox (2004), Kaplan and Norton (2004,2008)	
Organisation -al Capital			
	Service Scope (1)	Luftman (1996)	SIM Survey (48)
	Service Governance (3)	Luftman (1996)	Luftman and Kempaiah (2008)
	Organisational Structure and Responsibilities (4)	Luftman (1996)	Case Study (64)
	IT Governance (9)	Luftman (1996)	
	Constraints and opportunities (20)	Maes et al. (2000), Mintzberg (1987)	
	Interrelationship (30)	Deming (1993), Hillmer and Karney (1997), Seddon (2005), McNulty and Ferlie (2004), Bhatia and Drew (2006), Goldratt and Cox (2004), Kaplan and Norton (2004,2008)	
	Communication (37)	Deming (1996)	

Appendix Q – Transcription and Manipulation Coding

Table Q-1 Thematic Coding Structure

Code	Categories	Sub Category 1	Sub Category 2	Sub Category 3	Code
BH	Brief History				BH
BH-AB		Audit base			BH-AB
BH-W		Wales			BH-W
BH-L		Local			BH-L
DRIV	Drivers				DRIV
ROL	Role				ROL
ROL-SR		Specific Role			ROL-SR
ROL-H		How came Involved			ROL-H
ROL-M		Motivations			ROL-M
ROL-W		Working/Involved with			ROL-W
INF	Influences				INF
INF-C		Private Sector			INF-C
INF-S		National Strategies			INF-S
INF-S-E			England		INF-S-E
INF-S-W			Wales		INF-S-W
INF-P		National Policies			INF-P
INF-P-E			England		INF-P-E
INF-P-W			Wales		INF-P-W
INF-L		Shared Language			INF-L
INF-KB		Knowledge Brought			INF-KB
INF-KT		Knowledge Transfer to Area			INF-KT
INF-T		Politically			INF-T
SEQ	Sequence of Events				SEQ
SEQ-RES		Research			SEQ-RES
SEQ-P		Proposal			SEQ-P

SEQ-R		Requirements			SEQ-R
SEQ-R-M			Methodology		SEQ-R-M
SEQ-R-M-P				Best Practice	SEQ-R-M-P
SEQ-R-M-L				Lean	SEQ-R-M-L
SEQ-R-M-ST				System Thinking	SEQ-R-M-ST
SEQ-R-M-PM				Process Mapping	SEQ-R-M-PM
SEQ-R-M-R				BPR	SEQ-R-M-R
SEQ-R-D			Documentation		SEQ-R-D
SEQ-R-P			Procurement		SEQ-R-P
SEQ-R-F			Information		SEQ-R-F
SEQ-R-T			IT		SEQ-R-T
SEQ-G		Design			SEQ-G
SEQ-D		Development			SEQ-D
SEQ-K		Market			SEQ-K
SEQ-T		Testing			SEQ-T
SEQ-I		Implementation			SEQ-I
SEQ-I-R			Training		SEQ-I-R
SEQ-I-T			IT		SEQ-I-T
SEQ-S		Support			SEQ-S
SEQ-S-U			Upgrades		SEQ-S-U
SEQ-S-D			Development		SEQ-S-D
SEQ-S-K			Ongoing Practical Knowledge		SEQ-S-K
BENT	Benefits				BENT
BENT-D		Dis Benefit			BENT-D
BENT-A		Auditdata			BENT-A
BENT-N		Financial			BENT-N
BENT-F		Flow			BENT-F
BENT-T		Developments (inc Service Development)			BENT-T

BENT-C		Culture			BENT-C
BENT-W		Standard Way of Working			BENT-W
BENT- X		Manage Complexity			BENT- X
BENT-I		Information			BENT-I
BENT-I-P			Patient Data		BENT-I-P
BENT-I-A			Appointments		BENT-I-A
BENT-P		Productivity			BENT-P
BENT-S		Strategic Compliance			BENT-S
BENF	Beneficiary				BENF
BENF-A		Auditdata			BENF-A
BENF-U		Users of system			BENF-U
BENF-U-A			Admin		BENF-U-A
BENF-U-C			Clinicians		BENF-U-C
BENF-U-D			Audiologists		BENF-U-D
BENF-U-M			Management		BENF-U-M
BENF-P		Patients			BENF-P
BENF-M		Management			BENF-M
BENF-W		Wales			BENF-W
BENF-W-U			User Groups		BENF-W-U
KS	Key Success Factors				KS
KN	Key Negative Factors				KN
KN-B		Barriers			KN-B
KN-I		Inhibitors			KN-I
KN-I-T			Training		KN-I-T
KN-I-M			Time		KN-I-M
KP	Key Positive Factors that helped				KP

KP-E		Enablers			KP-E
KP-W		Wales			KP-W
REFL	Reflection				REFL
DOC	Documents				DOC
DOC-EP		End of Project Reports			DOC-EP
DOC-LL		Lessons Learnt			DOC-LL
DOC-D		Project Diary			DOC-D
PI	People Involved				PI
PI-I		To interview			PI-I
PI-D		Made a difference			PI-D
PI-D-T			Technically		PI-D-T
PI-D-A			Analysis		PI-D-A
PI-D-L			Leadership		PI-D-L
PI-D-P			Professionally		PI--D-P
PI-D-C			Clinically		PI-D-C
RIS	Risks				RIS
RIS-M		Managerial			RIS-M
RIS-PS		Private Sector			RIS-PS
RIS-F		Future			RIS-F
RIS-D		Local Dept			RIS-D
PB	Pushing Boundaries				PB
PB-R		Professionally			PB-R
PB-T		Technically			PB-T
PB-P		Politically			PB-P
PB-M		Managerially			PB-M
PB-J		Project			PB-J

Figure Q-1 Coding Summary Report Example (Extract)

Coding Summary Report

Project: DBA Assignment SkyDrive
Generated: 15/08/2012 07:09

Coding By

Name	Initials
LUGG	L

Total Users 1

Internals\Interviews\Participant 2 **Document**

Node Coding	References	Coverage
Tree Nodes\Beneficiary	**1**	**0.51%**

Reference 1 Coverage 0.51% *Character Range* 32260 - 32436

I mean there are places like us who ... its just part of the infrastructure you get on and use it, its fantastic, the majority are places like that but I suppose the lesson is...

Node Coding	References	Coverage
Tree Nodes\Beneficiary\Beneficiary-Auditdata	**1**	**0.41%**

Reference 1 Coverage 0.41% *Character Range* 25987 - 26128

and she became the best salesperson for the product and when anyone came to visit us afterwards she always used to be the best salesperson.

Node Coding	References	Coverage
Tree Nodes\Beneficiary\Beneficiary-Patients	**4**	**3.77%**

Reference 1 Coverage 2.33% *Character Range* 20466 - 21277

The second one was the ability to book appointments, because all appointments were online so suddenly the clinician had in their power to say well can you see me next Wednesday and do it in real-time. So that was easy.
Managing waiting lists- a lot of countries don't understand waiting lists but in the NHS we have waiting lists and being able to manage those in systematic, structured way was also fantastic benefit and I was the departmental manager, I could look and see how many patients we have waiting for various things whereas before I would ask for lists of those things and people will go and get piles cards and say there are these many cards waiting for x and there is in somebody else's draw another pile, we'll go and find them, it was a mess in terms of understanding capacity and demand.

Reference 2 Coverage 0.52% *Character Range* 21847 - 22029

References

ACKOFF, R. (1971). Towards A System of Systems Concepts. *Management Science,* Vol.17, No.11, pp. 661-671.

ADVICEUK (2008). *It's the System, Stupid! Radically Rethinking Advice*, AdviceUK.

AHLSTROM, P. (2004). Lean service operations: translating lean production principles to service operations. *International Journal of Services Technology and Management Accounting Research,* Vol. 5, No. 5, pp. 545-564.

ANDERSON, D. K. & MERNA, T. (2003). Project management strategy – project management represented as a process based set of management domains and the consequences for project management strategy. *International Journal of Project Management,* Vol. 21, No. 6, pp. 387–93.

APM (2006). *Body of Knowledge, fifth ed*, Association for Project Management, High Wycombe, UK.

ARGYRIS, C. (1990). *Overcoming Organizational Defences: Facilitating Organizational Learning*, Allyn and Bacon, Boston, MA.

ARGYRIS, C. (1999). *On Organisational Learning*, Blackwell Publishing: London.

ARGYRIS, C. & SCHÖN, D. (1974). *Theory in practice: Increasing professional effectiveness*, San Francisco: Jossey-Bass.

ARITUA, B., SMITH, N. J. & BOWER, D. (2010). What risks are common to or amplified in programmes: Evidence from UK public sector infrastructure schemes. *International Journal of Project Management,* Vol. 29, No. 3, pp. 303-312.

ARTTO, K. & DIETRICH, P. (2004). Strategic business management through multiple projects. *In:* MORRIS, P. & PINTO, J. (eds.) *The Wiley Guide to Managing Projects.*: Hoboken (NJ): Wiley, Inc. pp. 144–76.

ARTTO, K. A. & WIKSTRÖM, K. (2005). What is project business? *International Journal of Project Management,* Vol. 23, No. 5, pp. 343-353.

AUDIOLOGYONLINE. (2013). *HIMSA Hearing Instrument Manufacturer's Software Association* [Online]. AudiologyOnline. Available: http://www.audiologyonline.com/expo/himsa/ [Accessed 13/01/2013].

AUDITBASE USER GROUP UK. (2011). *What is Audit Base?* [Online]. Available: http://www.auditbase-usergroup.org.uk/what_is_auditbase.php [Accessed 11/08/2011].

AUDITDATA. (2011). *About Auditdata* [Online]. auditdata. Available: http://www.auditdata.com/index.php?m=46&c=2&i=18 [Accessed 11/08/2011].

AVISON, D. & FITZGERALD, G. (1995). *Information Systems Development: Methodologies, Techniques and Tools, Second edition.*, Glasgow, UK, McGraw-Hill International.

AVISON, D., JONES, J., POWELL, P. & WILSON, D. (2004). Using and validating the strategic alignment model. *The Journal of Strategic Information Systems,* Vol.13, No. 3, pp. 223-246.

AVISON, D., LAU, F., MYERS, M. & NIELSEN, P. (1999a). Action Research. *Communications of the ACM,* Vol. 42, No. 1, pp. 94–97.

AVISON, D. & TAYLOR, V. (1997). Information systems development methodologies: a classification according to problem situation. *Journal of Information Technology,* Vol. 12, pp. 73-81.

AVISON, D. E., CUTHBERTSON, C. & POWELL, P. (1999b). The Status of the IS function. *Journal of Strategic Information Systems,* Vol. 8, No. 4.

AVISON, D. E. & FITZGERALD, G. (2003). Where Now for Development Methodologies. *Communications of the ACM,* Vol.46, No 1, pp. 79-82.

BAETS, W. (1992). Aligning Information Systems with Business Strategy. *Journal of Strategic Information Systems,* Vol. 1, No. 4, pp. 205-213.

BAETS, W. J. (1996). Some Empirical Evidence on IS Strategy. Alignment in banking. *Information & Management,* Vol. 30, No. 4, pp. 155-177.

BAETS, W. R. J. & GALLIERS, R. D. E. (eds.) (1998). *Information Technology and Organizational Transformation*: New York: John Wiley and Sons.

BARCLAY, D. W., CHAN, Y. E., COPELAND, D. E. & HUFF, S. L. (1997). Business Strategic Orientation, Information Systems Strategic Orientation and Strategic Alignment. *Information Systems Research,* Vol. 8, No. 2, pp. 125-150.

BATESON, J. (2002). Are your customers good enough for your service business? *Acadamy of Management Journal,* Vol. 16, No. 4, pp. 110-120.

BBC. (2013a). No internet access in 17% of UK homes, ONS data shows. *BBC NEWS TECHNOLOGY* [Online]. Available: http://www.bbc.co.uk/news/technology-23620856 [Accessed 25/08/2013].

BBC. (2013b). Welsh budget facing further £1.5bn of cuts, warns IFS. *BBC NEWS WALES POLITICS* [Online]. Available: http://www.bbc.co.uk/news/uk-wales-politics-24272048 [Accessed 28/09/2013].

BECK, K. (2000). *eXtreme Programming eXplained*, Upper Saddle River, NJ: Addison-Wesley.

BECK, K. & ANDRES, C. (2005). *Extreme Programming Explained: Embrace Change*, Boston: Addison-Wesley.

BECK, K., BEEDLE, M., BENNEKUM, A. V., COCKBURN, A., CUNNINGHAM, W., FOWLER, M., GRENNING, J., HIGHSMITH, J., HUNT, A., JEFFRIES, R., KERN, J., MARICK, B., MARTIN, R. C., MELLOR, S., SCHWABER, K., SUTHERLAND, J. & THOMAS, D. (2001). *Manifesto for Agile Software Development* [Online]. Available: http://agilemanifesto.org/ [Accessed 26/04/2014].

BEEDLES, M. (2012). *Pivot Point: Making the decisions that matter in business*, Teak Yew

BESNER, C. & HOBBS, B. (2006). The perceived value and potential contribution of project management practices to project success. *Project Management Journal,* Vol. 37, No. 3, pp. 37-48.

BETSI CADWALADR UNIVERSITY HEALTH BOARD (2011). Research & Development Approval - Guidelines to the application process. Betsi Cadwaladr University Health Board.

BEVAN FOUNDATION (2011). Online public services and digital inclusion in Wales.

BEVAN, G. & HOOD, C. (2006). Have targets improved performance in the English NHS? *British Medical Journal,* Vol. 332, No. 7538, pp. 419-422.

BHATIA, N. & DREW, J. (2006). Applying Lean production to the public sector. *The McKinsey Quarterly* [Online], Vol. June. Available: http://executivesondemand.net/managementsourcing/images/stories/artigos_pdf/produtividade/Applying_lean_production_to_the_public_sector.pdf [Accessed 27/04/2014].

BLEISTEIN, S. J., COX, K. & VERNER, J. (2006). Validating strategic alignment of organizational IT requirements using goal modeling and problem diagrams. *Journal of Systems and Software,* Vol. 79, No. 3, pp. 362-378.

BOEHM, B. W. & TURNER, R. (2004). *Balancing Agility and Discipline: A Guide for the Perplexed.*, Boston: Addison-Wesley.

BONOMA, T. V. (1985). Case Research in Marketing: Opportunities, Problems, and a Process. *Journal of Marketing Research,* Vol. XXII, No. May, pp. 199-208.

BORBAS, C., MORRIS, N., MCLAUGHLIN, B., ASINGER, R. & GOBEL, F. (2000). The Role of Clinical Opinion Leaders in Guideline Implementation and Quality Improvement. *Chest* [Online], Vol 118, No.2_Suppl. Available: http://journal.publications.chestnet.org/article.aspx?articleid=1079102 [Accessed 29/07/2013].

BOWENS, F. M., FRYE, P. A. & JONES, W. A. (2010). Health Information Technology: Integration of Clinical Workflow into Meaningful Use of Electronic Health Records. *Perspect Health Inf Manag.* [Online], 7(Fall):1d. Available: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2966355/ [Accessed 29/07/2013].

BRANCHEAU, J. & WETHERBE, J. (1987). Issues In Information Systems Management. *MIS Quarterly,* Vol. 11, No. 1, pp. 23-45.

BROADBENT, M. & WEILL, P. (1993). Improving Business and Information Strategy Alignment: Learning from the Banking Industry *IBM Systems Journal,* Vol. 32, No. 1, pp. 162-179.

BROWN, C. V. & MAGILL, S. L. (1998). Reconceptualizing the Context-Design Issue for the Information Systems Function. *Organization Science,* Vol. 9, No.2, pp. 176-194.

BRUCE, S. (2009). Advice to Informing Healthcare. Available: http://www.e-health-insidr.com/news/5239/advice_to_informing_healthcare [Accessed 28/09/2009].

BUBENKO, J. A. (1986). Information Systems Methodologies: A Research View *IN: OLLE, T.W., SOL, H.G., and VERRIJN-STUART, A. A. (eds) Information Systems Design Methodologies: Improving the practice.* Amsterdam: North Holland.

BURN, J. M. (1997). A Professional Balancing Act: Walking the Tightrope of Strategic Alignment. *IN Steps to the future-fresh thinking on the management of IT-based organisational transformation.* The Jossey-Bass business & management series.

CABINET OFFICE (2010). Digital by Default proposed government services.

CAMBRIDGE UNIVERSITY HOSPITALS. (2013). *CUH signs contracts to transform patient services through IT* [Online]. Available: http://www.cuh.org.uk/cms/news/communications/cuh-signs-contracts-transform-patient-services-through-it [Accessed 18/05/2013].

CAMBRIDGE UNIVERSITY PRESS. (2013). *Cambridge Dictionaries Online* [Online]. Cambridge University Press

Available: http://dictionary.cambridge.org/dictionary/business-english/ict [Accessed 27/10/2013].

CHAN, F. K. Y. & THONG, J. Y. L. (2009). Acceptance of agile methodologies: A critical review and conceptual framework. *Decision Support Systems,* Vol. 46, pp. 803-814.

CHAN, Y., HUFF, S., BARCLAY, D. & COPELAND, D. (1997). Business Strategic Orientation: Information Systems Strategic Orientation and Strategic Alignment. *IN: BLEISTEIN, S. J., COX, K. & VERNER, J. 2006. Validating strategic alignment of organizational IT requirements using goal modeling and problem diagrams. Journal of Systems and Software, 79, 362-378.*

CHAN, Y. E. & REICH, B. H. (2007). IT alignment: what have we learned? *Journal of Information Technology,* Vol. 22, pp. 297 -315.

CHECKLAND, P. (1990). *Soft Systems Methodology in Action*, Wiley.

CHECKLAND, P. (1999). *Systems thinking, systems practice: Includes a 30-year retrospective*, 1st Ed, Wiley.

CHECKLAND, P. & HOLWELL, S. (1998). *Information, Systems and Information Systems - making sense of the field*, John Wiley and Sons.

CHO, I. & KIM, Y. G. (2001). Critical factors for assimilation of object-orientated programming languages. *Journal of Management Information Systems,* Vol. 18, No. 3, pp. 125-156.

CIBORRA, C. U. (1997). De profundas? Deconstructing the concept of strategic alignment. *Scandinavian Journal of Information Systems,* Vol. 9, No. 1, pp. 67-82.

COAD, P., DE LUCA, J. & LEFEBRE, E. (1999). *Java Modelling in Color*, Englewood Cliffs, NJ:Prentice Hall.

COAKLEY, J. R., FIEGENER, M. K. & WHITE, D. M. (Year). Assessing Strategic IT Alignment in A Transforming Organisation. *In:* Proceedings of the Association for Information Systems, 1996 Phoenix Arizona.

COCKBURN, A. (2007). *Agile Software Development: The Cooperative Game.*, Addison-Wesley.

COLLIS, J. & HUSSEY, R. (2003). Business research: A practical guide for undergraduate and post graduate students (2nd edn) [online]. Palgrave Macmillan. Available from: http://lib.myilibrary.com?ID=25100 Accessed on 30//5/2011.

COOPER, D. & SCHINDLER, P. (2003). *Business Research Methods (8th Edn.)*, International Edition, London: McGraw Hill.

CRESWELL, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions,* Thousand Oaks, CA, Sage Publications.

CRESWELL, J. W. (2003). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, (2nd ed),* California, Sage Publications.

CROTEAU, A.-M. & BERGERON, F. (2001). An information technology trilogy: business strategy, technological deployment and organizational performance. *IN: BLEISTEIN, S. J., COX, K. & VERNER, J. 2006. Validating strategic alignment of organizational IT requirements using goal modeling and problem diagrams. Journal of Systems and Software, 79, 362-378.*

DAVENPORT, T. H. (1993). *Process Innovation:Reengineering Work through Information Technology*, Harvard Business School Press, Boston.

DAVENPORT, T. H. (1995). Business Process Reengineering: Where It's Been, Where It's Going. *IN: Grover, V. and Kettinger, W.J. (eds), Business Process Change: Concepts, Methods and Technologies. Idea Publishing, Harrisburg PA, 1995, pp 1-13.*

DAVENPORT, T. H. & SHORT, J. E. (1990). The new industrial engineering:Information technology and business process redesign. *Sloan Management Review,* Vol. 31, No. 4, pp. 11-27.

DAVIS, G. B. (1979). Comments on the Critical Success Factors Method for Obtaining Management Information Requirements in Article by John F.Rockart. *MIS Quarterly,* Vol. 3, No.3, pp. 57-58.

DEMING, W. E. (1986). *Out of the Crisis*, MIT Press.

DEMING, W. E. (1993). *The New Economics for Industry, Education, Government*, Cambridge, MA: Massachusetts Institute of Technology, Center for Advanced Engineering Study.

DEVORE, S. D. & FIGLIOLI, K. (2010). Lessons Premier Hospitals Learned About Implementing Electronic Health Records. *Health Affairs* [Online], Vol. 29 no 4 664-667. Available: http://content.healthaffairs.org/content/29/4/664/664.full [Accessed 29/07/2013].

DIETRICH, P. & LEHTONEN, P. (2005). Successful management of strategic intentions through multiple projects - Reflections from empirical study. *International Journal of Project Management,* Vol. 23, No. 5, pp. 386-391.

DIGITAL WALES ADVISORY NETWORK (2012). *Your Government Online, Digidol yn Gyntaf - Digital First, Delivering Welsh Public Services Online.*

DINGSØYR, T., NERUR, S., BALIJEPALLY, V. & MOE, N. B. (2012). A decade of agile methodologies: Towards explaining agile software development. *The Journal of Systems and Software,* Vol. 85, pp. 1213-1221.

DIXON, P. & JOHN, D. (1989). Technology Issues Facing Corporate Management in the 1990s. *MIS Quarterly,* Vol. 13, No. 3, pp. 247-55.

DRUCKER, P. F. (1988). The coming of the new organisation. *Harvard Business Review* (January-February 1988), 45-53 IN: VAN DER ZEE, J. T. M. & DE JONG, B. 1999. Alignment Is Not Enough: Integrating Business and Information Technology Management with the Balanced Business Scorecard. Journal of Management Information Systems,16, 2, 137-156.

DYBÅ, T. & DINGSOYR, T. (2008). Empirical Studies of Agile Software Development: A Systematic Review. *Information and Software Technology,* Vol. 50., No. 9-10, pp. 833-859.

EARL, M. (ed.) (1988). *Information Management:The Strategic Dimension*: Oxford Press, Oxford.

EARL, M. J. (1983). *Corporate Information Systems Management*, Homewood, Ill: Richard D. Irwin, Inc.

EARL, M. J. (1989). *Management strategies for information technology*, Prentice Hall.

EARL, M. J. (1993). Experience in Strategic Information Systems Planning. *MIS Quarterly,* Vol. 17, No. 1, pp. 1-24.

EISENHARDT, K. M. (1989). Building Theories fram Case Study Research. *Acadamy of Management Review,* Vol. 14, No. 4, pp. 532-550.

EISENHARDT, K. M. & GRAEBNER, M. E. (2007). Theory Building From Cases: Opportunities And Challenges. *Acadamy of Management Journal,* Vol. 50, No. 1, pp. 25-32.

ERICKSON, J., LYYTINEN, K. & SIAU, K. (2005). Agile modelling, agile software development, and extreme programming. *Journal of Database Management,* Vol. 16, pp. 88-100.

EUL, M., FREYBERG, A. & JAEGER, R. (2010). IT in the Telecom Industry: Reaching the Next Level. *AT Kearney.*

EVA, M. & GUILFORD, S. (Year). Committed to a Radical approach? A survey of systems development methods in practice. *In:* Proceedings of the british computer society's annual conference on information system methodologies pp.87-96, 1996.

FERNANDEZ, D. J. & FERNANDEZ, J. D. (2008). Agile Project Management -- Agilism versus Traditional Approaches. *Journal of Computer Information Systems,* Vol. 49, No. 2, pp. 10-17.

FITZGERALD, B. (1998). An empirical investigation into the adoption of systems development methodologies. *Information Management,* Vol. 34 No. 6, pp. 317-328.

FITZGERALD, B., HARTNETT, G. & CONBOY, K. (2006). Customising Agile Methods to Software Practices at Intel Shannon. *European Journal of Information Systems,* Vol. 15.,No. 2., pp. 200-213.

FLOOD, R. (1999). *Rethinking The Fifth Discipline, Learning within the unknown,* Routledge.

FORRESTER, J. W. (1958). Industrial Dynamics: a Major Breakthrough for Decision Makers. *Harvard Business Review,* Vol. 36, No.4, pp.37-66.

FRIES, H. S. (1936). On an Empirical Criterion of Meaning. *Philosophy of Science,* Vol. 3, No. 2, pp. 143-151.

FRUHLING, A. & DE VREEDE, G.-J. (2006). Field Experiences with eXtreme Programming: Developing an Emergency Response System. *Journal of Management Information Systems,* Vol. 22. No. 4, pp. 39-68.

GALLIERS, R. & NEWELL, S. (2003). Strategy as data + Sense Making. *IN: Cummings, S., Wilson, D. (Eds.), Images of Strategy. Blackwell, Oxford, pp. 164–196.*

GALLIERS, R. D. (1987). *Information systems planning in Britain and Australia in the mid-1980s : key success factors. [electronic resource]* [Online]. University of London. Available: http://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.262134 [Accessed 21/06/2010].

GALLIERS, R. D. (2004). Reflections on Information Systems Strategizing. *IN C. Avgerou, C. Ciborra and F. Land (eds.) The Social Study of Information and Communication echnology, 1st edn, London: Oxford University Press, pp. 231–262.*

GAULD, R. (2007). Public sector information system project failures: Lessons from a New Zealand hospital organization. *Government Information Quarterly,* Vol. 24, No. 1, pp. 102-114.

GILL, J. & JOHNSON, P. (1997). *Research Methods for Managers,* London, Paul Chapman Publishing Ltd.

GLASER, B. G. & STRAUSS, A. L. (1967). *The Discovery of Grounded Theory,* Chicago, Aldine.

GLASS, R. L. (1999). A snapshot of systems development practice. *IEEE Software,* Vol. 16, No. 3, pp. 111-112.

GOEDVOLK, J. G. (1999). White Paper Integrated Architecture Framework. Cap Gemini, Presentation with lecture notes.

GOLDRATT, E. M. & COX, J. (2004). *The goal : a process of ongoing improvement,* Aldershot, Gower.

GOULD, R. M. (1996). Getting from strategy to action:processes for continuous change. *Long Range Planning, Vol. 29, No. 3, pp. 278-289.,* IN: HSIAO, R.L., & ORMEROD, R.J. 1998 A new perspective on the dynamics of information technology-enabled strategic change. Information Systems Journal, 8, 1, 21-52.

.

GREAT BRITAIN. OFFICE OF GOVERNMENT, C. (2002). *Managing successful projects with PRINCE2,* Great Britain, Office of Government Commerce.

GREAT BRITAIN. OFFICE OF GOVERNMENT, C. (2007). *Managing successful programmes,* London, TSO.

GUNN, R. A. (1997). It's Time to Fire Dilbert: Towards Dynamic Strategic Alignment. *IN: MAES, R., RIJSENBRIJ, D., TRUIJENS, O. & GOEDVOLK, H. (2000). Redefining business – IT alignment through a unified framework, University van Amsterdam.*

HAMMER, M. & CHAMPY, J. (1993). *Reengineering the Corporation: A Manifesto for Business Revolution,* Nicholas Brealey, London.

HAMMER, M. & MANGURIAN, G. E. (1987). The Changing Value of Communication Technology. *Sloan Management Review,* Vol. Winter, pp.65-71.

HARDGRAVE, B. C., DAVIS, F. D. & RIEMENSCHNEIDER, C. K. (2003). Investigating determinants of software developers' intentions to follow methodologies. *Journal of Management Information Systems,* Vol. 20, No. 1., pp. 123-151.

HAUGAN, G. T. (2002). *Effective Work Breakdown Structures,* Vienna, Management Concepts Press.

HAZLETT, S. A. & HILL, F. (2000). Policy and practice: an investigation of organizational change for service quality in the public sector in Northern Ireland. *Total Quality Management,* Vol. 11, Nos. 4-6, pp. 4–6.

HELLSTORM, M. & WIKTROM, K. (2005). Project business concepts based on modularity – improved maneuverability through unstable structures. *International Journal of Project Management,* Vol. 23, No. 5, pp. 392–397.

HENDERSON-SELLERS, B. & SEROUR, M. K. (2005). Creating a dual-agility method: the value of method engineering. *Journal of Database Management,* Vol. 16, pp. 1-23.

HENDERSON, J. & VENKATRAMAN, N. (1990). *Strategic Alignment:A Model For Organizational Transformation Via Information Technology,* Massachusetts, Sloan School of Management, Massachusetts Institute of Technology.

HENDERSON, J. & VENKATRAMEN, N. (1989). Strategic Alignment: A Model for Organisational Transformation. *IN: AVISON, D., JONES, J., POWELL, P. & WILSON, D. 2004. Using and validating the strategic alignment model. The Journal of Strategic Information Systems, 13, 223-246.*

HENDERSON, J. C. & THOMAS, J. B. (1991). Aligning Business and Information Technology Domains: Strategic Planning in Hospitals. *Hospital and Health Services Administration,* Vol. 37, No. 1, pp. 71-87.

HENDERSON, J. C. & VENKATRAMAN, N. (1993). Strategic alignment: leveraging information technology for transforming organizations. *IBM Systems Journal* Vol. 32, No. 1, pp. 4–16.

HERIC, M., KERMISCH, R. & BETRAND, S. (2011). The Five Faces of the Cloud. *Bain & Company,* IN: LUFTMAN, J, & TAL. B. 2011. *Key Issues for IT Executives 2011: Cautious Optimism in Uncertain Economic Times. MIS Quarterly Executive 10, 4.*

HIDDING, G. J. (1997). Reinventing methodology: Who reads it and why? *Communications of the ACM,* Vol. 40, No. 11, pp.102-109.

HIGHSMITH, J. (2000). *Adaptive software Development: A Collaborative Approach to Managing Complex Systems.*, New York: Dorset House Publishing.

HIGHSMITH, J. & COCKBURN, A. (2001). Agile software development. 1. The business of innovation. *IEEE Computer,* Vol. 34, pp. 120-127.

HILLMER, S. & KARNEY, D. (1997). Towards understanding the foundations of Deming's theory of management. *Journal of Quality Management,* Vol. 2, No. 2, pp. 171-189.

HIRSCHHEIM, R., KLEIN, H. K. & LYYTINEN, K. (1996). Exploring the intellectual foundations of information systems. *Accounting, Management and Information Technologies,* Vol. 6, No. 1/2., pp. 1-64.

HOUY, T. (2005). ICT and Lean Management: Will They Ever Get Along? *Communications & Strategies,* Vol. 59, pp.53.

HSIAO, R. L. & ORMEROD, R. J. (1998). A new perspective on the dynamics of information technology-enabled strategic change. *Information Systems Journal,* Vol. 8, No. 1, pp. 21-52.

HUISMAN, M. & IIVARI, J. (2006). Deployment of systems development methodologies: Perceptual conguence between IS managers and system developers. *Information Management,* Vol. 43, No. 1, pp. 29-49.

IBM (1981). *Business Systems Planning, Planning Guide GE20-0527,* White Plains, NY: IBM Corporation.

IIVARI, J., HIRSCHHEIM, R. & KLEIN, H. K. (1998). A Paradigmatic Analysis Contrasting Information Systems Development Approaches and Methodologies. *Information Systems Research,* Vol. 9, No. 2, pp. 164-193.

IIVARI, J., HIRSCHHEIM, R. & KLEIN, H. K. (2000). A Dynamic Framework for Classifying Information Systems Development Methodologies and Approaches. *Journal of Management Information Systems,* Vol.17, No. 3, pp. 179-218.

IIVARI, J. & HUISMAN, M. (2007). The Relationship Between Organizational Culture And The Deployment Of Systems Development Methodologies. *MIS Quarterly,* Vol. 31, No.1, pp. 35-58.

INFORMING HEALTHCARE (2006). *International Advisory Group Visit.*

INFORMING HEALTHCARE (2007). *International Advisory Group Visit.*

INFORMING HEALTHCARE (2009a). *Achievements Report 2009*, Informing Healthcare.

INFORMING HEALTHCARE (2009b). *Application Strategy for NHS Wales*, Informing Healthcare.

INFORMING HEALTHCARE (2009c). *Information Security Strategy*, Informing Healthcare.

INFORMING HEALTHCARE (2009d). *National Infrastructure for NHS Wales - Strategic Outline Programme*, Informing Healthcare.

JACKSON, M. (2003). *System Thinking: Creative Holism for Managers*, Wiley and Sons: Chichester.

JAYARATNA, N. (1994). *Understanding and Evaluating Methodologies: NIMSAD, a Systematic Framework,* Maidenhead, UK, McGraw-Hill.

JOHNSON, G. & SCHOLES, K. (1993). *Exploring corporate strategy : text and cases,* New York ; London, Prentice Hall.

JOHNSON, G., SCHOLES, K. & WHITTINGTON, R. (2008). Exploring Corporate Strategy. Eighth ed.: Prentice Hall.

JONES, G. R. (1987). Organizational-client transactions and organizational governance structures. *Acadamy of Management Journal,* Vol. 30, No. 2, pp. 197-218.

KAPLAN, R. S. & NORTON, D. P. (1996). *The Balanced Scorecard - Translating Strategy Into Action,* Boston, Massachusetts, Harvard Business School Press.

KAPLAN, R. S. & NORTON, D. P. (2004a). Having Trouble with Your Strategy? Then Map It. *OnPoint Collection* [Online], September-October 2000. Available: http://www.paca-online.org/cop/docs/Kaplan%2BNorton_Balanced_Scorecard_-_3_articles.pdf [Accessed 12/04/2013].

KAPLAN, R. S. & NORTON, D. P. (2004b). Measuring the Strategic readiness of Intangible Assets. *OnPoint Collection* [Online], February 2004. Available: http://www.paca-online.org/cop/docs/Kaplan%2BNorton_Balanced_Scorecard_-_3_articles.pdf [Accessed 12/04/2013].

KAPLAN, R. S. & NORTON, D. P. (2004c). Putting the Balanced Scorecard to Work. *OnPoint Collection* [Online], September-October. Available: http://www.paca-

online.org/cop/docs/Kaplan%2BNorton_Balanced_Scorecard_-_3_articles.pdf [Accessed 12/04/2013].

KAPLAN, R. S. & NORTON, D. P. (2004d). *Strategy Maps - Converting Intangible Assets Into Tangible Outcomes,* Boston, Harvard Business School Press.

KAPLAN, R. S. & NORTON, D. P. (2004e). Using the Balanced Scorecard as a Strategic Management System. *OnPoint Collection* [Online], January-February 1996. Available: http://www.paca-online.org/cop/docs/Kaplan%2BNorton_Balanced_Scorecard_-_3_articles.pdf [Accessed 12/04/2013].

KAPLAN, R. S. & NORTON, D. P. (2008). *The Execution Premium : Linking Strategy to Operations for Competitive Advantage,* Boston, Mass., Harvard Business School Press ; London : McGraw-Hill [distributor].

KETTINGER, W. J., TENG, J. T. C. & GUHA, S. (1997). Business process change: A study of methodologies, techniques, and tools. *MIS Quarterly,* Vol. 21, No. 1, pg 55-79.

KING, S. F. (2007). Citizens as customers: Exploring the future of CRM in UK local government. *Government Information Quarterly,* Vol. 24, No. 1, pp. 47-63.

KING, S. F. & BURGESS, T. F. (2006). Beyond critical success factors: A dynamic model of enterprise system innovation. *International Journal of Information Management,* Vol. 26, No. 1, pp. 59-69.

KNIGHT, A. (2014). *Pride and Joy*, Never Say I Know.

KOCH, A. S. (2005). *Agile Software Development:Evaluating the methods for your organisation*, Artech House, Boston.

KOSKELA, L. & HOWELL, G. (Year). The underlying theory of project management is obsolete. *In:* Proceedings of the PMI Research Conference pp. 293-302, 2002.

LABOVITZ, G. & ROSANSKY, V. (1997). *The Power of Alignment*, John Wiley & Sons.

LEACH, L. P. (2005). *Critical Chain Project Management*, Artech House, Inc.

LEAVITT, H. J. (1965). Applied Organizational Change in Industry. *IN: Handbook of Organizations, Rand McNally, Chicago,IL, Chapter 27.*

LEDERER, A. L. & MENDELOW, A. L. (1989). Coordination of information systems plans with business plans. *IN: BYRD, T. A., LEWIS, B. R. & BRYAN, R. W. 2006. The leveraging influence of strategic alignment on IT investment: An empirical examination. Information & Management, 43, 3, 308-321.*

LEE, G. & XIA, W. (2010). Towards Agile: An Integrated Analysis Of Quantitative And Qualitative Field Data On Software Development Agility. *MIS Quarterly,* Vol.34, No.1, pp. 87-114.

LEWIS, C. I. (1929). *Mind and the World-order: Outline of a Theory of Knowledge*, Dover Publications, New York.

LINDERMAN, K., SCHROEDER, R. G., ZAHEER, S., LIEDTKE, C. & CHOO, A. S. (2004). Integrating quality management practices with knowledge creation processes. *Journal of Operations Management,* Vol. 22, No. 6, pp. 589-607.

LLEWELLYN, S. & TAPPIN, E. (2003). Strategy in the public sector: management in the wilderness. . *IN: ARITUA, B., SMITH, N. J. & BOWER, D. 2010. What risks are common to or amplified in programmes: Evidence from UK public*

sector infrastructure schemes. International Journal of Project Management, In Press, Corrected Proof.

LOGICALIS & WELSH ASSEMBLY GOVERNMENT. (2010). *The psba network* [Online]. Purestone. Available: http://www.psba.org.uk/ [Accessed 26/07/2010].

LUFTMAN, J., PAPP, R. & BRIER, T. (1999). Enablers and inhibitors of business-IT alignment. *Communications of the AIS,* Vol. 1, No. 3es, pp. 1.

LUFTMAN, J. N. (1996). *Competing in the Information Age: Practical Applications of the Strategic Alignment Model*, New York: Oxford University Press.

LUFTMAN, J. N. (1997). Align In The Sand. *Computerworld Leadership Series,* Vol. 3, No. 2, pp. 1-11.

LUFTMAN, J. N. & DERKSEN, B. (2012). Key Issues for IT Executives 2012: Doing More with Less. *MIS Quarterly Executive,* Vol. 11, No. 4, pp. 207-218.

LUFTMAN, J. N. & KEMPAIAH, R. (2008). Key Issues For IT Executives 2007. *MIS Quarterly Executive,* Vol. 7, No. 2, pp. 99-112.

LUFTMAN, J. N., KEMPAIAH, R. & NASH, E. (2006). Key Issues For IT Executives 2005. *MIS Quarterly Executive,* Vol. 5, No. 2, pp. 81-99.

LUFTMAN, J. N., KEMPAIAH, R. & RIGONI, E. H. (2009). Key Issues For IT Executives 2008. *MIS Quarterly Executive,* Vol 8:3, pp 151-159.

LUFTMAN, J. N., LEWIS, P. R. & OLDACH, S. H. (1993). Transforming the Enterprise: The alignment of business and information technology strategies. *IBM Systems Journal* Vol. 32, No. 1, pp. 198-221.

LUFTMAN, J. N., PAPP, R. & BRIER, T. (1996). Business and IT in Harmony: Enablers and Inhibitors to alignment. *IN: AVISON, D., JONES, J., POWELL, P. & WILSON, D. 2004. Using and validating the strategic alignment model. The Journal of Strategic Information Systems, 13, 223-246.*

LUFTMAN, J. N., ZADEH, H. S., DERKSEN, B., SANTANA, M., RIGONI, E. H. & HUANG, Z. D. (2012). Key information technology and management issues 2011-12: an international study. *Journal of Information Technology,* 27, pp 198-212.

LYCETT, M., RASSAU, A. & DANSON, J. (2004). Programme management: a critical review. *International Journal of Project Management,* Vol. 23, No. 4, pp. 289–99.

LYYTINEN, K. (1987). A taxonomic perspective of information systems development:Theoretical constructs and recommendations. *IN: Critical issues in information systems research. John Wiley & Sons Inc. pp. 3-41. .*

MACDONALD, H. (1991). The Strategic Alignment Process. *IN Morton,S and Michael,S (eds.) The Corporation of the 1990s: Information technology and organizational transformation, 1st edn, London: Oxford Press, pp. 310–322.*

MAES, R. (1999). A Generic Framework for Information Management. *Prime Vera Working Paper* [Online], Vol. 99, No.3. Available: http://primavera.fee.uva.nl/html/working_papers.cfm [Accessed 20/03/2011].

MAES, R., RIJSENBRIJ, D., TRUIJENS, O. & GOEDVOLK, H. (2000). *Redefining business – IT alignment through a unified framework*, University van Amsterdam.

MCDONALD, M. & ARON, D. (2011). Reimagining IT: The 2011 CIO Agenda. *Gartner,* Vol. G00210382.

MCFARLAN, F. W. (1984). Information Technology Changes the Way You Compete. *Harvard Business Review,* Vol. 62, No.3, pp. 98-103.

MCKAY, J. & MARSHALL, P. (1999). 2x6=12, or Does It Equal Action Research? *IN AVISON, D., JONES, J., POWELL, P. & WILSON, D. 2004. Using and validating the strategic alignment model. The Journal of Strategic Information Systems, 13, 223-246.*

MCLEAN, E. & SODEN, J. (1977). *Strategic Planning for MIS,* New York, John Wiley and Sons.

MCNULTY, T. & FERLIE, E. (2004). Process Transformation: Limitations to Radical Organizational Change within Public Service Organizations. *Organisational Studies,* Vol. 25, No. 8, pp. 1389-1412.

MILES, M. & HUBERMAN, A. M. (1984). *Qualitative data analysis*, Beverly Hills, CA. Sage Publications.

MILES, M. & HUBERMAN, A. M. (1994). *Qualitative data analysis: An expanded sourcebook.*, Thousand Oaks, CA: Sage.

MINTZBERG, H. (1987). Crafting Strategy. *Harvard Business Review*, pp. 66-75.

MINTZBERG, H. (1990). The Design School: Reconsidering the basic Premises of Strategic Management. *Strategic Management Journal,* Vol. 11, No. 3, pp. 171-195.

MOE, N. B., DINGSØYR, T. & DYBA, T. (2010). A teamwork model for understanding an agile team: a case study of a Scrum project. *Information and Software Technology,* Vol. 52, pp. 480-491.

MOE, N. B., DINGSØYR, T. & DYBÅ, T. (Year). Understanding Self-Organising Teams in Agile Software Development. *In:* Proceedings of the 19th Australian Conferences on Software Engineering, Perth, Australia, pp. 76-85., 2008.

MOHAN, K. & AHLEMANN, F. (2013). Understanding acceptance of information system development and management methodologies by actual users: A review and assessment of existing literature. *International Journal of Information Management,* Vol. 33, pp. 831-839.

MRC HEARING & COMMUNICATION GROUP. (2013). *NHS Modernising Hearing Aid Services (MHAS)* [Online]. The University of Manchester. Available: http://www.mrchear.info/cms/Resources.aspx?Action=Folder&ResourceID=329 [Accessed 13/01/2013].

NATIONAL ASSEMBLY FOR WALES (2001). *Improving Health in Wales - A plan for the NHS with its partners* National Assembly for Wales.

NATIONAL PATIENT SAFETY AGENCY. (2012). *Integrated Research Application System* [Online]. National Patient Safety Agency. Available: https://www.myresearchproject.org.uk/ [Accessed 02/02/2012].

NAVE, D. (2002). How To Compare Six Sigma, Lean and the Theory of Constraints - A framework for choosong what's best for your organization. *Quality Progress,* Vol. 35, No. 3, pp. 73-78.

NEAVE, H. R. (1990). *The Deming dimension*, Knoxville, TN: SPC Press Inc.

NERUR, R., MAHAPATRA, G. & MANGALARAJ, G. (2005). Challanges of migrating to agile methodologies. *Communications of the ACM,* Vol. 48, No. 5., pp. 73-78.

NHS CONNECTING FOR HEALTH. (2013). *NHS Connecting For Health (NHS CFH)* [Online]. Department of Health. Available: http://www.connectingforhealth.nhs.uk/ [Accessed 27/10/2013].

NHS ENGLAND (2013). *Safer Hospitals, Safer Wards: Achieving an Integrated Digital Care Record.*

NIEDERMAN, F., BRANCHEAU, J. C. & WETHERBE, J. C. (1991). Information Systems Issues for the 1990s. *MIS Quarterly,* Vol. 15, No. 4, pp. 475-500.

NISCHR PERMISSIONS CO-ORDINATING UNIT (2011). Gaining NHS Research Permission In Wales - A Guide For Reseachers. NISCHR PCU.

NOLAN NORTON AND CO. (1991). Measuring Performance in the Organisation of the Future: A Research Study. *Lexington, MA:Executive Summary. IN: VAN DER ZEE, J. T. M. & DE JONG, B. 1999. Alignment Is Not Enough: Integrating Business and Information Technology Management with the Balanced Business Scorecard. Journal of Management Information Systems, 16, 2, 137-156.*

NORDEN, P. V. (1993). Qualitative Techniques in Strategic Alignment. *IBM Systems Journal,* Vol. 32, No. 1, pp. 180-197.

NORMANN, R. (1984). *Service management:Strategy and leadership in service businesses,* Chichester, England, Wiley.

NORTH WALES TRUST (2009). *North Wales NHS Reform Group - IM&T Workstream,* North Wales NHS Trust.

O'BRIEN, B. (1995). *Information Management Decisions - Briefings and Critical Thinking,* London, Pitman Publishing.

O'CONNELL, F. (2007). *Fast Projects - Project management when time is short,* Pearson Education Limited.

OFCOM (2012). *Ofcom Communications Market Report.*

OFFICE OF THE DEPUTY PRIME MINISTER (2005). *A Systematic Approach to Service Improvement Evaluating Systems Thinking in Housing,* ODPM publications, London.

OHNO, T. (1988). *Toyota Production System,* Productivity Press:Portland, Oregon. Translated from Japanese original, first published 1978.

OLIVEIRA, M. G. & ROZENFELD, H. (2010). Integrating technology roadmapping and portfolio management at the front-end of new product development. *Technological Forecasting and Social Change,* Vol. 77, No. 8, pp. 1339-1354.

OSAMA, A. (2006). *Multi-Attribute Strategy and Performance Architectures in R&D. The Case of The Balanced Scorecard,* Rand Corporation, CA.

OTLEY, D. & BERRY, A. (1994). Case Study Research in Management Accounting and Control. *Management Accounting Research,* Vol. 5, No. 1, pp. 45-65.

OTRUSINOVA, M. & PASTUSZKOVA, E. (2012). Concept of 3E's and Public Administration Performance. *International Journal Of Systems Applications, Engineering & Development,* Vol. 6, No. 2, pp. 171-178.

PAPP, R. (1995). *Determinants of Strategically Aligned Organizations: A Multiindustry, Multi-perspective Analysis.* (Dissertation) Hoboken, NJ: Stevens Institute of Technology.

PAPP, R. (1999). Business-IT alignment: productivity paradox payoff? *Industrial Management & Data Systems,* Vol. 99, No. 8, pp. 367-373.

PAPP, R. (2001). *Strategic Information Technology: Opportunities for Competitive Advantage* IDEA Publishing Group.

PAPP, R. & MOTIWALLA, L. (1996). A Knowledge Based System For Measuring Business-IT Alignment. *IN: AVISON, D., JONES, J., POWELL, P. & WILSON, D. 2004. Using and validating the strategic alignment model. The Journal of Strategic Information Systems, 13, 223-246.*

PARKER, M. & BENSON, R. (1988). *Information Economics*, Englewood Cliffs, NJ: Prentice-Hall.

PARKER, M. M., BENSON, R. J. & TRAINOR, H. E. (1988). *Information Economics: Linking business performance to information technology*, Englewood Cliffs,NJ: Prentice-Hall.

PARSON, G. L. (1983). Information Technology: A New Competitive Weapon. *Sloan Management Review,* Vol. 25, No. 1, pp. 3-14.

PEAK, D., GUYNES, C. S. & KROON, V. (2005). Information technology Alignment Planning--a case study. *Information & Management,* Vol. 42, No. 4, pp. 619-633.

PELLEGRINELLI, S. (1997). Programme management: organising project-based change. *International Journal of Project Management,* Vol. 15, No. 3, pp. 141-149.

PELLEGRINELLI, S. (2002). Shaping context: the role and challenge for programmes. *International Journal of Project Management,* Vol. 20, No. 3, pp. 229-233.

PELLEGRINELLI, S. (2008). *Thinking and Acting as a Great Programme Manager*, Palgrave Macmillan, Basingstoke,UK.

PELLEGRINELLI, S. (2010). What's in a name: Project or programme? *International Journal of Project Management,* Vol. 29, No. 2, pp. 232-240.

PELLEGRINELLI, S. & PARTINGTON, D. (Year). Pitfalls in taking a project-based view of programmes. *In:* Proceedings, PMI Congress 2006 - Europe, Madrid, Spain, 2006.

PHAAL, R., FARRUKH, C. J. P. & PROBERT, D. R. (2004). Technology roadmapping - A planning framework for evolution and revolution. *Technological Forecasting and Social Change,* Vol. 71, No. 1 pp. 5-26.

PHAAL, R., FARRUKH, C. J. P. & PROBERT, D. R. (2006). Technology management tools: concept, development and application. *Technovation,* Vol. 26, No. 3, pp. 336-344.

POELS, R. (2006). *Beïnvloeden en meten van business - IT alignment (in Dutch).* Dissertation VU University Amsterdam, Amsterdam.

PORTER, M. (1987). From competitive advantage to corporate strategy. *IN: BLEISTEIN, S. J., COX, K. & VERNER, J. 2006. Validating strategic alignment of organizational IT requirements using goal modeling and problem diagrams. Journal of Systems and Software, 79, 362-378.*

PORTER, M. E. & MILLAR, V. E. (1985). How information gives you competitive advantage. *Harvard Business Review,* Vol. 64, No. 4, pp. 149–160.

POWELL, T. C. (1992). Organizational Alignment as Competitive Advantage. *Strategic Management Journal,* Vol. 13, No. 2, pp. 119-134.

PUBLIC ACCOUNTS COMMITTEE (2009). The National Programme for IT in the NHS: Progress since 2006. HC 153 (2008-09).

QUINN, J. B., DOORLEY, T. L. & PAQUETTE, P. C. (1989). Beyond Products: Services-Based Strategy. *Harvard Business Review,* Vol. 68, No. 2, pp. 58-60.

RADNOR, Z. & BUCCI, G. (2007). *Evaluation of PaceSetter (Lean, Senior Leadership and Operational Management) vi/ithin HMRC processing*, HM Revenue & Customs.

RADNOR, Z. & WALLEY, P. (2006). Lean on me... *Public Finance,* Vol. 28 pp.16-19.

RADNOR, Z. & WALLEY, P. (2008). Learning to Walk Before We Try to Run: Adapting Lean for the Public Sector. *Public Money & Management,* Vol. 28, No. 1, pp. 13-20.

RADNOR, Z., WALLEY, P., STEPHENS, A. & BUCCI, G. (2006). *Evaluation of the lean approach to business management and its use in the public sector*, Scottish Executive, Edinburgh.

RAGHUNATHAN, S. (1996). A structured modelling based methodology to design decision support systems. *Decision Support Systems,* Vol. 17, No. 4., pp.299-312.

REICH, B. & BENBASAT, I. (2000). Factors that Influence the Social Dimension of Alignment between Business and IT Objectives. *MIS Quarterly,* Vol. 24, No. 1, pp. 81-113.

REICH, B. H. & BENBASAT, I. (1990). Measuring the linkage between business and information technology objectives. *IN: BYRD, T. A., LEWIS, B. R. & BRYAN, R. W. 2006. The leveraging influence of strategic alignment on IT investment: An empirical examination. Information & Management, 43, 308-321. .*

REICH, B. H. & BENBASAT, I. (1993). Development of measures to investigate the linkage between business and information technology objectives. *MIS Quarterly,* Vol. 20, No.1, pp. 55-81.

REIFER, D. J. (2002). How good are agile methods? *IEEE Software,* Vol. 19, No. 4, pp.16-18.

RISING, L. & JANOFF, N. S. (2000). The Scrum Software Development Process for Small Teams. *IEEE Software,* Vol. July/August, pp. 26-32.

ROCKART, J. F. (1979). Chief Executives Define Their Own Data Needs. *Harvard Business Review,* Vol. 57, No. 2, pp. 81-93.

ROCKART, J. F., EARL, M. J. & ROSS, J. W. (1996). Eight Imperatives for the New IT Organization. *Sloan Management Review,* Vol. 38, No. 1, pp. 43-55.

ROCKART, J. F. & SCOTT-MORTON, M. (1984). Implications of Changes in Information Technology for Corporate Strategy. *Interfaces,* Vol. 14, No. 1, pp. 84-95.

RONDINELLI, D., ROSEN, B. & DRORI, I. (2001). The Struggle for Strategic Alignment in Multinational Corporations: Managing readjustment during global expansion. *European Management Journal,* Vol. 19, No. 4, pp. 404-416.

RUSSO, N. L., HIGHTOWER, R. & PEARSON, J. M. (Year). The failure of methodologies to meet the needs of current development environments. *In:* Proceedings of the british coınputer society's annual conference on information system methodologies pp. 387-393, 1996.

SAUNDERS, M., LEWIS, P. & THORNHILL, A. (2006). *Research Methods for Business Students (4th Edn.)*, Harlow: Financial Times Prentice Hall.

SAUNDERS, M., LEWIS, P. R. & THORNHILL, A. (2007). *Research Methods for Business Students,* (4th edn.) London, Financial Times Prentice Hall.

SCAPENS, R. W. (1990). Researching Management Accounting Practice: The Role of Case Study Methods. *British Accounting Review,* Vol. 22, No. 3, pp. 259-81.

SCHWABER, K. & BEEDLE, M. (2002). *Agile Software Development with Scrum,* Upper Saddle River, NJ: Prentice-Hall.

SCOTT-MORTON, M. (ed.) (1991). *The Corporation of the 1990s: Information Technology and Organizational Transformation* Oxford University Press, Oxford.

SEDDON, J. (2002). *Systems Thinking and Performance Improvement in the Public Sector*, Vanguard, Buckingham.

SEDDON, J. (2003). *Freedom From Command and Control*, Vanguard, Buckingham.

SEDDON, J. (2005). *Freedom from Command and Control*, Vanguard Press Buckingham.

SEDDON, J. (2008). *Systems Thinking in the Public Sector*, Triarchy Press.

SEDDON, J. & CAULKIN, S. (2007). Systems thinking, lean production and action learning. *Action Learning Research and Practice,* Vol. 4, No.1, pp. 9-24.

SEDDON, J. & O'DONOVAN, B. (2010a). Rethinking Lean Service - Part One. *Management Services,* Vol. 54, No. Spring, pp. 34-37.

SEDDON, J. & O'DONOVAN, B. (2010b). Rethinking Lean Service - Part Two. *Management Services,* Vol. 54, No. Summer, pp. 14-19.

SENGE, P. M. (1990). The Fifth Discipline. The art and practice of the learning organisation. *IN: LEACH, L. P. 2005. Critical Chain Project Management, Artech House, Inc. pp. 34-36.*

SHENHAR, A. J., DVIR, D., LEVY, O. & MALTZ, A. C. (2001). Project Success: A Multidimensional Strategic Concept. *Long Range Planning,* Vol. 34, No. 6, pp. 699-725.

SHEWHART, W. A. (1939). *Statistical Method from the Viewpoint of Quality Control.*, The Graduate School the Department of Agriculture, Washington, DC. Reprint, 1986. with introduction by W. Edwards Deming. Dover Publications, New York.

SHOSTACK, G. L. (1987). Service positioning through structural change. *Journal of Marketing,* Vol. 5, No. 1, pp. 34-43.

SIAU, K. & TAN, X. (2005). Special Theme of Research in Information Systems Analysis and Design - IV: Evaluation Criteria for Information Sysyems Development Methodologies. *Communications of the AIS,* Vol. 16, pp. 860-876.

SIEBER, J. (1992). Planning ethically responsible research: A guide for students and internal review boards. *Applied Social Research Methods Series,* Vol. 31, Newbury Park, CA: Sage Publications.

SILVESTER, K., LENDON, R., BEVAN, H., R., S. & WALLEY, P. (2004). Reducing waiting times in the NHS: is lack of capacity the problem? *Clinician in Management,* Vol. 12, No. 3, pp. 105-111.

SILVIUS, A. J. G., DE WAAL, B. & SMIT, J. (Year). Business and IT Alignment; Answers and Remaining Questions. *In:* Pacific Asia Conference on Information Systems (PACIS), 2009. Association of Information Systems.

SKAGGS, B. C. & HUFFMAN, T. R. (2003). A Customer Interaction Approach To Strategy And Production Complexity Alignment In Service Firms. *Acadamy of Management Journal,* Vol. 46, No. 6, pp. 775-786.

SMACZNY, T. (2001). IS an Alignment between Business and IT the Appropriate Paradigm to Manage IT in Today's Organisation? *Management Decision,* Vol. 39, No. 10, pp. 797–802.

SMITE, D., MOE, N. B. & AGERFALK, P. J. (2010). Fundementals of agile distributed software development. *IN: Smite, D., Moe, N.B., Agerfalk, P.J. (Eds), Agility across time and space. Springer-Verlag, Berlin, Heidelberg, pp. 333-337.*

SPEAR, S. & BOWEN, H. (1999). Decoding the DNA of the Toyota Production System. *Harvard Business Review,* Vol. 7, pp. 96-108.

SRIVANNABOON, S. & MILOSEVIC, D. Z. (2004). The process of translating business strategy in project actions. *In:* SLEVIN DP, PINTO JK & CLELAND DI (eds.) *Innovations Project Management Research.* Newtown Square, PA: Project Management Institute.

SRIVANNABOON, S. & MILOSEVIC, D. Z. (2006). A two-way influence between business strategy and project management. *International Journal of Project Management,* Vol. 24, No. 6, pp. 493-505.

STANKOVIC, D., NIKOLIC, V., DJORDJEVIC, M. & CAO, D. (2013). A survey study of critical success factors in agile software projects in former Yugoslavia IT companies. *The Journal of Systems and Software,* Vol. 86, pp. 1663-1678.

STAPLETON, J. (1997). *DSDM: Dynamic Systems Development Method.*, Harlow, England: Addison Wesley.

SULTAN, F. & CHAN, L. (2000). The adoption of new technology: the case of object-orientated computing in software companies. *IEEE Transactions on Engineering Management,* Vol. 47, No. 1, pp. 106-126.

TAGUCHI, G. (1986). Introduction to Quality Engineering. *Asian Productivity Association, Tokyo, Japan.*

TALLON, P. P. & KRAEMER, K. L. (2002). Executives' Perspectives on IT: Unraveling the Link Between Business Strategy, Management Practices and IT Business Value. *IN: BLEISTEIN, S. J., COX, K. & VERNER, J. 2006. Validating strategic alignment of organizational IT requirements using goal modeling and problem diagrams. Journal of Systems and Software, 79, 362-378.*

TANSIK, D. A. (1990). Balance in service systems design. *Journal of Business Research,* Vol. 20, No. 1, pp. 55-61.

TAYLOR, F. W. (1911). *The Principles of Scientific Management.* , Harper, New York, NY.

THIRY, M. (2002). Combining value and project management into an effective programme management model. *International Journal of Project Management,* Vol. 20, No. 3, pp. 221-227.

THIRY, M. (2004). "For DAD": a programme management life-cycle process. *International Journal of Project Management,* Vol. 22, No. 3, pp. 245-252.

THOMAS, D. R. E. (1978). Strategy is different in service businesses. *Harvard Business Review,* Vol. 56, No. 4, pp. 158-165.

THOMAS, G. (2009). Informing Healthcare. *Staff Briefing November 2009.*

TIDD, J. & BESSANT, J. (2009). *Managing Innovation: integrating technical, market and organizational change*, John Wiley and Sons Ltd.

VAN DER ZEE, J. T. M. & DE JONG, B. (1999). Alignment Is Not Enough: Integrating Business and Information Technology Management with the Balanced Business Scorecard. *Journal of Management Information Systems,* Vol. 16, No.2, pp. 137-156.

VENKATRAMAN, N. (2000). Five Steps to a Dot-Com strategy: How to find your footing on the web. *Sloan Management Review,* Vol. 41, No. 3 pp. 15–28.

VENKATRAMAN, N. & CAMILLUS, J. (1984). Exploring the concept of 'fit' in strategic management. *Acadamy of Management Review,* Vol. 9, No. 3, pp. 513-525.

VENKATRAMAN, N., HENDERSON, J. C. & OLDACH, S. (1993). Continuous strategic alignment: Exploiting information technology capabilities for competitive success. *European Management Journal,* Vol. 11, No. 2, pp. 139-149.

VENKATRANAN, N. (1989). The Concept of Fit in Strategy Research: Toward Verbal and Statistical Correspondence. *Acadamy of Management Review,* Vol. 14, No. 3, pp. 423-444.

VON BERTALANFFY, L. (1940). Der Organismus als physikalisches System betrachtet (the organism considered as physical system). *Die Naturwissenschaften,* Vol.28, pp. 521-531.

VON BERTALANFFY, L. (1950). An outline of General Systems Theory. *British Journal for the Philosophy of Science,* Vol. 1, pp. 139-164.

VON BERTALANFFY, L. (1972). *Forward to Laszlo, E., Introduction to Systems Philosophy: toward a new paradigm of contemporary thought*, Gordon and Breech Science Publications: London.

WANLESS, D. (2002). *Securing Our Future Health: Taking a Long-Term View* [Online]. Available: http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/consult_wanless_final.htm [Accessed 30/03/2011].

WANLESS, D. (2003a). *Review of Health & Social Care in Wales* [Online]. Welsh Assembly Government. Available: http://www.wales.nhs.uk/documents/wanless-summary-e.pdf [Accessed 30/12/2009].

WANLESS, D. (2003b). *The Review of Health and Social Care in Wales - The Report of the Project Team advised by Derek Wanless*, Welsh Assembly Government.

WEILL, P. & BROADBENT, M. (1998). *Leveraging the New Infrastructure*, Harvard Business School Press.

WELSH ASSEMBLY GOVERNMENT (2003). *Informing Healthcare strategy - transforming healthcare using information and IT*, Welsh Assembly Government.

WELSH ASSEMBLY GOVERNMENT (2004). *Making the Connections: Delivering Better Services for Wales*, Welsh Assembly Government.

WELSH ASSEMBLY GOVERNMENT (2010). *Delivering a Five-Year Service, Workforce and Financial Strategic Framework for NHS Wales*, Welsh Assembly Government.

WELSH ASSEMBLY GOVERNMENT (2011a). *NHS Wales - Annual Quality Framework 2011/2012*, Welsh Assembly Government.

WELSH ASSEMBLY GOVERNMENT. (2011b). *What is the Welsh Assembly Government?* [Online]. Available: http://wales.gov.uk/about/organisationexplained/what/?lang=en [Accessed 08/03/2011].

WELSH GOVERNMENT (2011). *Welsh Government's Programme for Government.*

WELSH OFFICE (1998). *Putting Patients First*, Welsh Office.

WELSH OFFICE (1999). *Better Information-Better Health - Information management and technology for healthcare and health inprovement in Wales: A strategic framework 1998 to 2005,* Cardiff, Welsh Office.

WIENER, N. (1948). *Cybernetics; or, Control and communication in the animal and the machine*, New York: Wiley.

WILLIAMS, L. A. & COCKBURN, A. (2003). Guest editors' introduction: agile software development: it's about feedback and change. *IEEE Computer,* Vol. 36, No. 6, pp. 39-43.

WINTER, M. & SZCZEPANEK, T. (2008). Projects and programmes as value creation processes: a new perspective and some practical implications. *International Journal of Project Management,* Vol. 26, No. 1, pp. 95-103.

WISEMAN, C. (1985). *Strategy and Computers:Information Systems as Competitive Weapons*, Dow Jones-Irwin, Homewood, IL.

WOMACK, J. P., JONES, D. T. & ROOS, D. (1990). *The Machine that Changed the World,* New York ; Rawson Associates ; Oxford, Maxwell Macmillan International.

WOMACK, J. P., JONES, D. T. & ROOS, D. (2007). *The Machine That Changed The World*, Macmillian, New York, First published 1990.

WOOLFE, R. (1993). The Path to Strategic Alignment. *Information Strategy: The Executive's Journal,* Vol. 9, pp. 13-13.

WYNEKOOP, J. L. & RUSSO, N. L. (1995). Systems development methodologies: Unanswered questions. *Journal of Information Technology,* Vol. 10, No. 2., pp. 65.

YETTON, P. (1997). False prophecies, Successful Practice, and Future Directions in IT Management. *IN: Sauer, C.,Yetton, P. et al. (Eds), Steps to the Future. Jossey-Bass, San Francisco.*

YETTON, P. W., JOHNSON, K. D. & CRAIG, J. F. (1994). Computer-aided architects: a case study of it and strategy change. *Sloan Management Review,* Vol. 35, No. 4, pp. 57-67.

YIN, R. K. (1981). The case study crisis: Some answers. *Administrative Science Quarterley,* Vol. 26, pp. 58-65.

YIN, R. K. (1984). *Case study research.*, Beverly Hills, CA: Sage Publications.

YIN, R. K. (1994). *Case Study Research: Design and Methods,* Beverly Hills, Sage.

YIN, R. K. (2009). *Case Study Research: Design and Methods,* U.S.A. 4th Edition, Sage.

ZHANG, P., CAREY, J., TE'ENI, D. & TREMAINE, M. (2005). Integrating Human-Computer Interaction Development into the Systems Development Life Cycle: A Methodology. *Communications of the AIS,* Vol. 15, pp. 512-543.

ZHUGE, H. (2003). Component-based workflow systems development. *Decision Support Systems,* Vol. 35, No. 4, pp. 517-536.

ZOKAEI, K., ELIAS, S., O'DONOVAN, B., SAMUEL, D., EVANS, B. & GOODFELLOW, J. (2010). *Lean and Systems Thinking in the Public Sector in Wales.*